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ECONOMIC POLICY, ORGANIZATION AND MANAGEMENT

METHODOLOGY FOR NEW PROGRAMS NEEDS REFINEMENT

Kiev EKONOMIKA SOVIETSKOY UKRAINY in Russian No 4, Apr 81 pp 10-16

[Article by V. Golikov, professor and doctor of economic sciences: "Methodological Questions in the Drafting of Comprehensive Target Programs"]

[Text] The systems-target approach to managing a socialist economy is not new, but is an indispensable and lasting condition of the socialist economy's existence. The increased attention which is being paid to it at present has objectively resulted from the scientific-technical revolution, which has made social production more complicated. We should particularly note the rapid widening of the differentiation of social production and the emergence of a large number of new industries and production operations and organizations representing them. This has made it necessary to enlist numerous participants from different industries, ministries and departments to perform socioeconomic, scientific-technical and production tasks. The attention paid to the systems approach is also explained in large part by the dynamism of contemporary economic life. In the present period it is increasingly common for completely new tasks to have to be performed. Their performance requires new technological and organizations procedures, often procedures which must first be developed or tested in scientific and project planning organizations. Enhancement of the dynamic interaction between project planning and science on the one hand and production on the other is a typical feature of the present moment, one that also makes it necessary to apply the comprehensive approach to planning and managing the economy, to drafting specialized comprehensive target programs along with the overall plan. At present, when there is talk about accomplishing a change of direction in management of the country's national economy toward use of the systems approach, the reference is above all to combining the national economic plan more and more organically with a set of the most important socioeconomic, economic-organizational, ecological and scientific-technical programs. It is improvement of management on the basis of the systems approach that considerably raises the scientific level of planning and management thanks to organic unification of the existing methods of balances with the set of the most important comprehensive target programs, thanks to a deepening of planning principles by virtue of the detailed drafting of measures to implement them, and also thanks to the comprehensive and thorough justification of the strategies for solving the problems of the national economy in general.

In his speech at the October (1980) Plenum of the CPSU Central Committee L. I. Brezhnev, referring to the problems of improving management, pointed to the need

to make "extensive use of the method of target programs. Every such program should be a sound plan, based on precise calculations, of measures aimed at a final result, at the complete solution of the particular problem. It is important that the program state the stages and sequence of the tasks to be performed. And finally, there needs to be a system for administration of the program which clearly establishes personal responsibility for each part of the effort and grants the necessary rights. Otherwise the program is not a program, but an accumulation of good intentions."

In the 11th Five-Year Plan the systems approach has increased considerably in planning, in followup on plan fulfillment and in improvement of the organization of management. This is largely to be explained by the fact that the comprehensive approach and comprehensive target programs in particular will be given their proper place.

At the 26th CPSU Congress L. I. Brezhnev paid considerable attention to the tasks of improving planning, to solving comprehensive problems and performing comprehensive programs, and, in particular, to drafting and carrying out the food program. "In order to solve the problem in a radical way it is deemed indispensable to draft a specific food program." N. A. Tikhonov also emphasized that "... increasing the level of scientific soundness of plans and broader use of target-program and balance methods of planning and progressive standards concerning utilization of resources should contribute to balanced proportions in the national economy."

There is no question that comprehensive target programs, supplementing the sectoral and regional breakdowns of the national economic plan, are a vigorous means of enhancing the comprehensiveness, scientific soundness and effectiveness of planning.

As V. V. Shcherbitskiy noted in his statement at the October (1980) Plenum of the Ukrainian CP Central Committee, six major comprehensive target programs are being drafted in the republic and constitute an integral part of the plan of the 11th Five-Year Plan. Their fulfillment will contribute to strengthening the technical base of the industries in the fuel and power complex, to increasing the efficiency with which energy resources are utilized, to performing tasks related to improvement of the quality of metal, to reduction of materials intensiveness, to a further rise in the efficiency of agricultural production, and to improved use of labor resources.

Compiling comprehensive target programs deepens the scientific foundations of national economic planning, since it enhances the importance of its orientation toward specific goals and makes it more systematic.

Considerable experience in the field of target planning and management has now been acquired in the country. USSR Gosplan has approved the "Basic Procedural Principles for Drafting Comprehensive National Economic Target Programs," and also the "Procedural Guidelines for Drafting Comprehensive Target Programs for Solving Regional Problems and for Shaping and Developing Regional Industrial Complexes." These documents on methods have set forth the approaches and procedure for drafting comprehensive target programs, have described the format of the programs and

the procedure for mutual relations among coparticipants in fulfilling and drafting the program. It would be difficult to overestimate the importance of these documents. But drafting comprehensive target programs in the process of compiling the national economic plan does not automatically solve all the problems of raising the scientific level of planning. There is a need for further improvement of the methodological foundations and improvement of the methods of national economic planning and, above all, improvement of the methodology for working out the targets and organizing the target-oriented stage of planning and of selecting the most effective targets and problems and also alternative versions of their accomplishment or solution. The main reason for this is that the systems conception of socialist social production is associated above all with an examination of all social phenomena as a complex consisting of hierarchically interrelated processes. Nor is this any accident, since conception of an economy as a set of processes organically interrelated in time and space, processes which are hierarchically cosubordinated and directed toward attainment of the general goal, is the basic idea of the systems approach. It is from these initial positions that comprehensive target programs are conceived as nothing other than organizational subprocesses in the social process of reproduction. Moreover, they in turn also consist of types of activity that are cosubordinated to attainment of the ultimate target of the program.

Orientation of socially useful activity toward an ultimate goal is a characteristic of social systems--the law of their social organization. Thus if we want to use the systems approach in organizing production, we should first of all draw up a system of all the efforts aimed at and guaranteeing fulfillment of the final goal and designate the specific participants, that is, use the principle of a tree of goals and the principle of specifically assigning each constituent operation. The question that arises every time in the process of using the systems approach is this: Has the system of tasks and those who are to perform them been defined with sufficient completeness? Certain principles have to be adhered to if the correct answer is to be made and if one is not to overlook some problem, task, some organization which is to perform an operation, and so on.

From the methodological standpoint the procedure for constructing the tree of goals and tasks has not yet been worked out very well. We should note first of all the theoretical weakness of the substantiation of the guiding principles and their incompleteness. The guiding principles include the "principle of competitiveness" and "clarity of formulation of each goal." It is further pointed out: that "formulation of the target must guarantee the possibility of quantitative or ordinal ('more--less,' 'better--worse') evaluation of the degree of its attainment; the goals at each level must be comparable in scale and importance."* Attention is also called to the need to take into account not only the direct connections, but also the indirect connections in the system of tasks and goals as well as to the need to use situational analysis in selecting the directions of development.**

* Fedorenko, N. P., Leybkind, Yu. R., Mayminas, Ye. Z., Modin, A. A., Shatalin, S. S., and Yun', O. M., "The System of Integrated Planning," *EKONOMIKA I MATEMATICHESKIYE METODY*, Vol 8, No 3, 1972.

** Aganbegyan, A. G., "Upravleniye sotsialisticheskim predpriyatiyem" [Management of the Socialist Enterprise], Moscow, *Ekonomika*, 1979, pp 112, 113.

These principles and rules deserve attention from the methodological standpoint. At the same time they can be stated in concrete terms, and the list of them can be completed if we rely on the dialectical method as the methodological foundation of the systems approach and the practice of socialist planning and adoption of programmatic decisions, of investment decisions, for example.

As we know, the dialectical method examines material and social phenomena in the context of their development. Consequently, in this case every goal of a social activity figures as a subjective anticipation of a future state. Further, every phenomenon is characterized both by its quantitative and qualitative aspects as well as by time and space coordinates; it consists of partial processes, and the latter in turn of concrete subprocesses which can be enumerated. All of the concrete and partial processes are organically--that is, by cause and effect--inter-related. The connections can moreover be either direct or indirect. The processes develop as quantitative changes pass over into qualitative changes in both a determined and also a random way. Development can also be manifested spontaneously. The state of the environment, which is an exceedingly important condition of the system's development, imposes this imprint on its character.

When any job is begun, as experience demonstrates, one should first imagine the final result, the goal of the activity. The need to revise the general goal and its qualitative and quantitative indicators and to break it down into concrete targets and tasks whose attainment ensures attainment of the overall goal, is quite obvious. It is not as simple as it first appears to do this work in the process of drafting comprehensive target programs. The reason for this is difficulties that arise because of errors: incorrect definition of the content of the targets, the overlooking of certain important tasks that ensure their fulfillment, adoption of a group goal as an individual goal. In drafting programs oriented toward a remote future with a high indeterminacy of events and different alternatives for solving problems, it is very important, then, to enlist experts with high qualifications to substantiate the directions and the organizational measures.

After the concrete targets have been defined, one should undertake to define the subprograms that ensure their fulfillment at the proper level of quality and quantity. When an analysis is made of the quantitative and qualitative nature of the process, one comes to the conclusion that the format consists of a slot for performance of the concrete process and five quantitative and qualitative characteristics: amount, fulfillment date, technical parameters, economic indicators and social characteristics. Each qualitative characteristic is in turn broken down into concrete indicators. Consequently, in order to ensure that tasks are performed to their full extent and at the proper level of quality, it is absolutely essential that one identify subprograms and measures to ensure the given volume, completion dates, and technical, economic and social indicators. It should be borne in mind in this connection that every goal, every direction and every organizational measure also has its concrete quantitative and qualitative description. The qualitative and quantitative characteristics are determined by society's concrete needs. In compiling the tree of goals and also in the process of compiling the comprehensive target program, then, particular attention should be paid to researching those requirements which are imposed as to the targets, the tasks, and

the final results of carrying out the program as a whole and its partial subprograms and the organizational and technical measures. A study must also be made of all the basic problems which are to be solved in performing the tasks at their proper level of volume and quality in a regional breakdown as well. In other words, the level, strategies and methods of performing the concrete tasks must be technically and economically substantiated. The role of the TEO [feasibility study] in comprehensive target programs is immeasurably more important than in the traditional planning approach that has taken shape in practice.

At the present time the problem of improving product quality and the quality of work is especially acute. That is why this group of problems should be singled out as a separate subprogram. That subprogram should reflect guaranteed attainment of the given technical, economic and social requirements imposed on the product and on the production process as a whole. The meeting of these requirements is guaranteed by reorganizing the conduct of applied scientific research, by improving planning, by establishing incentives and monitoring fulfillment of research projects, by organizing specialized scientific and experimental laboratories, and so on. Success in this will be furthered by reconstruction of the pilot and principal production facility, by introducing new technologies that ensure improvement of quality and which enhance reliability, esthetic appearance and the social and economic benefit. It is also important to pay attention to introduction of up-to-date metrological instruments and testing methods, to improvement of the setting of standards and to improved organization of the monitoring of product quality, establishment of incentive based on quality, and so on.

This scheme deserves attention not only by virtue of its specific content, but also because of the general methodological principles of constructing a structural and hierarchical tree of goals in general: identification of the general goal, the concrete targets, the qualitative and quantitative subtargets and the generalized subprograms of their fulfillment, and the directions and organizational measures for performing the tasks reflected in the tree of goals.

Managers usually are very familiar with their own economic entity, its internal and external relationships. In the general case, then, when the system of tasks and organizational measures is being defined, difficulties do not arise. But they may arise if some sort of acute economic problem is put on the agenda and the need arises to designate the organizations, production operations and types of work which might be involved in solving it. The difficulties arise not only because one needs to select those entities relevant to the job, but also because it is important to define the list and content of the partial tasks which are to be performed. In certain difficulties the difficulty consists of selecting the various participant organizations. When the tasks of a program are broken down into particular directions and concrete measures, consideration should be given to the character of the organizational structure of society and of production, and in particular one should remember the social division of labor within society and within the enterprise and take into account specialization by product and by stages. The systems approach is distinguished not only by the fact that the enterprise, the industry, the republic or the country's economy are regarded as systems, but also by the fact that those systems include the interrelations of those entities with other economic entities and with social processes. Objectivity

requires that we take into account all the processes and stages that ensure fulfillment of the ultimate task. For example, the growth of the output of a particular product cannot be determined solely on the basis of the need of that industry itself, without envisaging the relevant measures to increase the output of intermediate products in supplier industries and ignoring competitive demand of other industries for the primary raw materials used in making these products. If the manufacture of an innovation is being planned, one cannot do without scientific research and design of the production process and of the organization of production that is appropriate to it.

In the context of the social division of labor implementation of the systems approach is becoming possible thanks to the fact that planning and management are relying on the intersector principle and, in particular, on the principle of the unity of scientific research, design, experimentation, production itself and the needs of society (demand). The comprehensive target program, which subordinates science and production to a single goal, presupposes that scientific developments will be applied to production.

Scientific-technical progress is speeding up product obsolescence. Sources of raw materials and energy are also being depleted. That is why in drafting multiannual plans it is very important to make provision for scientific research to determine the prospects for a given product's production. It is important to simulate the course of events in the future so as to take into account possible situations concerning the supply of raw materials and trends and rates of technical progress in all related sectors and industries. The principle of working out the prospects for the development of all interrelated processes and of using situational analysis and forecasting methods is a scientifically substantiated necessity and an exceedingly important feature in the systems approach to drafting measures for performing socioeconomic tasks and for carrying out resource programs. In order to determine which lines require a greater amount of attention, we need to study scientific-technical spadework and to examine possible situations in development of the production of the given type of product and of its possible substitutes.

It is important to represent as accurately as possible the future development of all elements of the system to be managed, the industrial destiny of discovery and inventions, the character of their application and their influence on the course of development of technology and on the organizational forms of plants and factories. One must be ready for such unexpected qualitative change of direction in the character of production as, say, the transition to automation of production, nuclear generation of electric power, man-made materials, powder metallurgy, and so on. The situation may not even be so complicated. For example, in drafting the program for development of an industry the question might arise of whether a plant should be built with the traditional or a new production technology. In this case it is very important to have a glance into the future, preferably over the planning period, using a forecast of scientific-technical progress. This authentically guarantees that the most correct solution will be selected. It should be constantly borne in mind that a change in the scheme for carrying out any element of the program necessitates transformation of its other elements. For example, changing the site for location of an oil extraction plant or its capacity could involve a change in the regional pattern of raw material zones and of their size and a shift of freight flows and directions for highways under construction.

In compiling the tree of the system's goals and in composing the corresponding system of production operations and processes to be managed, consideration must be given not only to the overall goal, but also to the concomitant tasks which the industry is required to perform as a part of the broader system--the national economy. For example, in drafting and approving the necessary measures to guarantee construction of a new plant with a new production process, it is of fundamental importance to envisage the ancillary tasks of environmental protection, construction of kindergartens, schools, and so on,

The more complicated the comprehensive target program, the more dependent its fulfillment is on scientific, project planning and experimental production operations and outside participants, and the larger the number of tasks encompassed by the problem, the greater the detail in which it is necessary to work out its component elements and the more scrupulously the time connections should be worked out. The time schedule and use of networking methods of compiling it are a necessary condition for making planning and management more systematic. As a rule the network schedule, as the most effective method of organizing operations in time, is as a rule a mandatory and integral part of the program. In the program approach increased attention is paid not only to scheduling deadlines for completion of operations and their strict sequence, but also to meeting the customer's requirements with respect to the quality of the product delivered and the job performed.

The systems approach, in which the role of assessment of the specific alternatives for developing the elements of the system to be managed and the alternatives for development of the system as a whole increases, necessitates substantiation of the criteria to be used in judging the benefit to be obtained from choosing the best versions of development.

It is very important in compiling and carrying out a comprehensive target program to achieve the correct distribution of financial and material resources. In principle this work differs little in its method from the analogous work in compiling the national economic plan. It is specific because the programs are aimed at performing new tasks which contain many indeterminacies related to scientific exploration, project planning and experimentation. That is why broader use should be made in this case of methods of distributing resources based on expert evaluation and taking into account the importance of the respective operations. There are an adequate number of appropriate methods in the arsenal of science. The methods of mathematical economics have also been brought to a good point of development for selecting advantageous versions with respect to one or several criteria.

So, the systems approach in the form of comprehensive target programs is a specific and higher form of centralized planned management of social processes. The leading link in this approach is the program itself, which is a binding document that contains the entire set of elements necessary to organizing its fulfillment and to which the plans or sections of plans of enterprises and organizations have been subordinated. A properly compiled comprehensive target program brings together into a unified whole the technology and organization of the performance of operations, the financial and material support, and the mechanism of economic incentives and administrative motivation.

The sound selection of goals, alternative versions and operations oriented toward fulfillment of the ultimate general goal, mutually reconciled in time and space and furnished material and financial resources is made according to definite rules (principles): precise statement of the general goal, detailing the general goal into specific targets, establishing quantitative and qualitative indicators for each concrete target, defining the direction for meeting and performing the qualitative and quantitative goals and tasks, identifying the concrete measures of the program to perform the quantitative and qualitative tasks, and disaggregation to the point where all the new problems and tasks have been precisely stated, that is, breaking down the task into operations which are well known and traditional. When a comprehensive target program is taking shape, it is detailed to the point of resource support where measures are envisaged to produce or deliver the resources. Wide use is made in drafting comprehensive target programs of the intersector approach, which takes into account both the direct and also indirect connections in production, competitiveness for the resources of related production operations, and the nonreproducibility of certain resources and interchangeability of others. In a comprehensive target program scientific research must have its proper place. The methods of situational analysis, forecasts and scenarios are widely used in drafting it. Scientists and specialists of diverse fields of knowledge are freely enlisted to draft schemes of development (scenarios).

In view of the specific nature of the tasks to be performed under comprehensive target programs, they require a specific supervisory body and management structure. This structure may either be organized specifically or the functions of supervising the program and its subprograms are assigned to the staff services of an existing managerial structure. The director of the program supervises the entire set of interrelated operations and relies on the respective chief specialists (designers, process engineers, economists, etc.) and the coordinating council. The intersector level of management of the program is usually supplemented by the bodies of intradepartmental administration. The duties of the supervisory body include organizing the compiling of the program and followup on its fulfillment.

In the process of organizing the structure of the management of the comprehensive target program consideration should be given to its specific nature, to its scale, to the existence of specialized subprograms and lines of operation, to the character of the regional dispersal of organizations and enterprises participating in its performance, and to their existing specialization. Along with the summary section, this makes it possible to correctly combine the regional and sectoral breakdown of the comprehensive target program and to substantiate the administrative structure and the functions and size of the management staff.

Improvement of planning and management on the basis of wide use of comprehensive target programs can prove most effective if the proper conditions are created to promote unhindered structural transformation both within departments and also at the interdepartment level of supervision of the program.

Use of the method of comprehensive target programming makes it an urgent necessity to expand the management rights of departments and organizations in the domain of reorganizing the management staff. It is necessary above all to make the

transition to the normative method of planning expenditures for management and to grant the management of sectoral ministries, departments and organizations the right to be independent, within the limits of the fund of expenditures for management, not only in reorganizing the structure of the management staff, but also in making changes in the organization chart. The transition should be made to more flexible specific forms of recruiting and dismissing specialists.

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PLANNING AND PLAN IMPLEMENTATION

UKRAINIAN GOSPLAN OFFICIAL NOTES ECONOMIC TRENDS

Kiev *Ekonomika Sovetskoy Ukrainy* in Russian No 4, Apr 81 pp 3-10

[Article by A. Yemel'yanov, director of ENII (Economic Scientific Research Institute) of USSR Gosplan and corresponding member of USSR Academy of Sciences: "Planning and Forecasting: Research Results, Problems and Prospects"]

[Text] The thorough analysis of the country's national economy contained in the address of L. I. Brezhnev delivered at the 26th CPSU Congress contains evidence that along with the substantial achievements confirming the advantages of the socialist economic system, the 10th Five-Year Plan, which is now past, advanced a number of essential problems concerning further improvement of planning and strengthening the effect of the economic mechanism on increasing production efficiency and work quality. The program for improving the economic mechanism which the party worked out in the period preceding the congress and which was approved by the 26th CPSU Congress included among the priority problems that of scientific substantiation of strategies for intensification of production, for making the economy better balanced, for orienting planning targets toward attainment of the final results from the standpoint of the national economy in all production units. There is a need for scientifically sound solutions to the problems of the interaction among plans of all types--current, medium-term and long-range, as well as departmental and regional--and also the problems of compiling and carrying out comprehensive target programs, improving systems analysis and the planning of particular processes and indicators in the national economy and within sectors in the context of the interaction and interdependence of various factors.

Solving all these problems ultimately comes down to strengthening the effect of the plan on the process of shaping effective structures, proportions and dynamic patterns in social production that ensure the planned augmentation of the economic potential, improvement of its utilization and a higher prosperity of the people on that basis.

Structural and dynamic problems of economic development ordinarily are multiannual in nature; a fairly lengthy period is adopted for solving them. Shaping tendencies in the structure and dynamic behavior of social production is a lengthy process. Managing those tendencies is a most important factor in effective development of a planned economy. The comprehensive forecast, which is based on thorough scientific studies of the main economic and social trends so as to take into

account the dynamic behavior of rates of scientific-technical progress and other factors, is the scientific basis for working out conceptions of economic development and for substantiating the directions and prospects of economic growth.

The Economics Scientific Research Institute (ENII) of UkSSR Gosplan is the head scientific organization in the republic for improving the planning and forecasting of economic development. It coordinates the research being done on 21 interdisciplinary topics by 77 scientific institutions and VUZ's in the Ukraine. This research is being done along two lines: studies of specific economic phenomena and theoretical and methodological studies. The former covers research to substantiate specific proposals for annual and 5-year plans of the republic's economic and social development and of individual sectors of the economy and also substantiation of forecasts covering the period up to the year 1990. Work being done along this line includes a number of analytical projects to discover and utilize production potential, to optimize the utilization of various types of resources, etc. The second line of research would include studies in the field of creating a set of scientifically sound methodologies and methods for bettering the planning of the most important economic processes and indicators related to improving the balance of the economy, production efficiency, utilization of labor and physical resources, regional development, etc. This line of research also covers work being done on improvement of methods of planning capital investments and fixed capital, on scientific-technical progress, on creating methods to support computerized planning systems, etc.

The "Comprehensive Forecast of the Economic Development of Ukrainian SSR" is a most important research topic along the line of specific economic research. Studies on this topic have been done by ENII of UkSSR Gosplan; a number of scientific research institutes of academies and specific sectors and industries were called upon, and the work was coordinated with the NIEI [Scientific Research Economics Institute] of USSR Gosplan. The deadlines for conducting the studies were governed by a single work program.

A mathematical economic model of the balance-optimization type, combining the balance and econometric approaches and the methods and procedures for computing indicators currently used in planning practice, was specifically developed to forecast indicators of the development of the economy and its sectors. Forecasting computations of the summary indicators of the development of the economy of Ukrainian SSR up to the year 1990 which had been performed by means of the model were used in substantiating the conceptions and hypotheses of the republic's long-range economic development.

The research covered both the problems of substantiating the conceptions of proportionality and balance of the development of the economy as a whole as well as the problems of the development of individual sectors of social production and the most important socioeconomic problems.* The conceptions which have been developed

* In the institute 5 doctoral and 41 candidate dissertations have been defended on these problems, 1,500 printer's sheets of scientific papers have been published, including the following monographs: "Ekonomika Sovetskoy Ukrainy. 1945-1975 gg." [The Economy of Soviet Ukraine. 1945-1975] (25.2 printer's sheets, by a group of

served as the point of departure for balancing the development of the economy to satisfy different combinations of resource indicators and summary indicators of the growth of social production and its particular sectors. This made it possible to link indicators of the development of individual sectors and to provide comprehensive solutions for the most important socioeconomic problems.

The methodological approach to preparing the comprehensive forecast of the republic's long-range social and economic development is based on successive linkage of the economy's resource capabilities to the requirements resulting from the need for a further rise in the prosperity of the people. The main stages of the work were done in a set sequence in order to ensure the comprehensiveness of the research and interlinkage of the composite parts of the forecast.

Thus the character of the most important trends and the conditions and factors influencing the development of the economy and its sectors were determined and evaluated in the first stage, and the existing raw materials base, labor resources, etc. were analyzed. Then an analysis and assessment were made of the republic's scientific-technical and economic potential, an assessment was made of the principal resources, the general conception was worked out and possible alternatives were determined for the long-range development of the USSR economy, and restrictions were accordingly worked out with respect to the number of employees, the volumes of capital investments, etc., and the forecast computations were made for the various alternatives and evaluated.

Substantiation of volumes and structures of the social product and of its sectoral, physical and economic content made it possible to ascertain indicators of the production and distribution of national income, to compute the efficiency of social

authors); "Obshchestvennoye proizvodstvo: dinamika, tendentsii, modeli" (Social Production: Dynamic Behavior, Trends, Models) (23 printer's sheets, A. S. Yemel'yanov); "Nauchno-tehnicheskiy progress i effektivnost' kompleksnoy pererabotki syr'ya i promyshlennosti" (Scientific-Technical Progress and the Efficiency of Multipurpose Processing of Raw Materials in the Industrial Sector) (10.6 printer's sheets, B. V. Sherbitskiy); "Proizvoditel'nost', tochnost', nadezhnost', effektivnost' primeneniya mashinostroitel'noy produktail v narodnom khozyaystve" (Productivity, Precision, Reliability and Economic Efficiency of the Products of Machine-building Used in the National Economy) (16.2 printer's sheets, M. T. Pashuta, R. K. Ushnevich, V. N. Shmareenko); "Problemy razvitiya i razmeshcheniya proizvoditel'nykh sil Yugo-Zapadnogo ekonomicheskogo rayona" (Problems in the Development and Location of Productive Forces of the Southwest Economic Region) (14.6 printer's sheets, V. I. Pila, N. M. Palanarchuk, D. M. Stetsenko); "Povysheniya effektivnosti raboty transporta v Ukrainской SSR" (Increasing the Operating Efficiency of Transportation in Ukrainian SSR) (14.7 printer's sheets, Yu. F. Kulayev, I. Kh. Skobets et al.); "Intensifikatsiya sel'skokhozyaystvennogo proizvodstva na sovremennom etape" (Intensification of Agricultural Production in the Present Stage) (10.5 printer's sheets, O. M. Golovanov, G. O. Kolesnik et al.); "Nauchno-metodicheskiye osnovy kompleksnogo planirovaniya ekonomicheskogo i sotsial'nogo razvitiya regiona" (Scientific Methods Which Serve as the Foundations of Comprehensive Planning of a Region's Economic and Social Development) (20.3 printer's sheets, by a group of authors), etc.

production, and to substantiate the volumes of accumulation and consumption for production and nonproduction purposes. The restrictions governing the forecasting computations were linked iteratively. The growth indicators of the standard of living of the people were analyzed and computed as products of the level of development of social production. Their determination was based on the volume and structure of the consumer budget and real personal income linked to the consumption fund and to sales turnover with an adequate commodity coverage.

The comprehensive forecast of the republic's long-range economic development consists of the following sections:

- a. balance of the economy and efficiency of social production;
- b. capital investments and fixed capital;
- c. scientific-technical progress and introduction of the advances of science and technology;
- d. labor resources and labor productivity;
- e. rise of the prosperity of the people and development of the nonproduction sphere;
- f. materials intensiveness of social production and physical balances;
- g. interrepublic relations;
- h. industrial sector;
- i. agriculture;
- j. construction and the building fabrications and parts industry;
- k. transportation.

The evaluation of the economic situation actually taking shape and also the conceptual principles which have been set forth and the analysis of trends in the development of the economy and its sectors made it possible to formulate and work out three alternative versions of the forecast of the republic's social and economic development oriented toward further consistent implementation of the course of the Communist Party toward raising the material and cultural standard of living of the people, above all by speeding up scientific-technical progress in all sectors of the economy, by expanding material and technical capabilities on that basis in order to make workers employed at manual labor available for other jobs, and to strengthen intensification of production.

The first variant of the forecast was worked out on the basis of the tasks of speeding up the development of the sectors and industries in the investment complex and other sectors and industries guaranteeing scientific-technical progress in all spheres of the economy. It made provision for distribution of limited

resources, first of all to the advantage of such industries as machinebuilding, electric power industry, the chemical industry and the petrochemical industry.

The second alternative was more oriented than the first toward solving the social problems and toward raising the standard of living of the people. The main feature distinguishing this version from the previous one is the substantial expansion of resources and the physical production base of the nonproduction sphere, mainly in order to speed up solution of the housing problem and to improve the entire system of social and cultural services to the public.

The third version of the forecast envisages prolongation of the rates, structure and proportions which have taken shape in the economy combined with simultaneous correction of the adverse phenomena and trends.

The alternative versions worked out for the forecast of the development of the USSR economy over the period 1981-1990 provide for meeting the conditions that ensure functioning of socialist expanded reproduction, the most important of which is the balance and rising efficiency of social production. Scientific-technical progress is regarded in the forecast as the principal factor for increasing the efficiency of social production. The development of science and technology was forecast on the basis of a detailed analysis of the patterns in the rise of the technical level of production, the results of applying to production the most promising lines of scientific-technical progress and the growth rates achieved on that basis and improvement of the proportions of social production.

The study and substantiation of the principal resource parameters, of capital investments and labor resources above all, were a most important condition in working out the forecast of the republic's economic development. The main tasks in studying these problems were to substantiate the optimum structure and restrictions in the form of limits in the breakdown by sectors and industries. Capital investments and fixed capital were examined in their interrelationship and interdependence with the dynamic behavior of the growth of production volumes, the level of utilization of production capacities, etc. This research resulted in substantiations of the reproductive pattern (relative proportions for new construction, reconstruction, modernization and retooling), the sectoral structure and the technological (relative proportions for specific purposes: e.g., buildings, machines and equipment, etc.) structure of capital investments and fixed capital as well as substantiation of volume indicators in a breakdown by sectors and industries, ministries and departments.

The forecast was worked out on the basis of the conception of the increasing role of intensive factors so as to take into account the trends of indicators used to evaluate the absolute and relative substitution of fixed capital for labor resources. A number of proposals were also drafted for ensuring balance between the number of new jobs created and labor resources; to raise the level of utilization of productive capital by increasing the number of shifts worked; to augment the share of capital investments assigned to replace outdated fixed capital retired and to raise the technical level of existing enterprises, etc.

Aside from the summary scientific report on the forecast of capital investments and fixed capital, relevant sections were also included in all the sectoral materials, which were linked to one another both by the uniform conceptions and methodological approaches as well as by the volume indicators in the balances. This made it possible to substantiate the main directions for increasing the efficiency of capital investments and fixed capital in a breakdown by sectors and industries.

The trends and prospects of the growth and use of the labor potential were substantiated on the basis of an analysis of demographic processes, labor productivity, directions in the retooling of production, and also the volume and structure of capital investments and fixed capital. The principal task of this section was to work out restrictions in the form of limits with respect to the labor indicators on the basis of trends in economic development so as to take into account the influence of faster scientific-technical progress. On the basis of an analysis of the adequacy of manpower for the sectors of the economy in the materials of the forecast prospective balances of labor resources were worked out, and the total and additional need for skilled workers were determined. Analogous balances were worked out by sectors and industries, departments and regions.

The scientific report contains an analysis and forecasting projections for the growth rate of the productivity of social labor and the impact of structural national economic factors on it, as well as substantiations of the indicators of sectors and industries. Aside from the summary report on the forecast of labor indicators, respective sections, linked to the summary report by the uniformity of the initial base and methodology of the computations, are also included in the sector forecast.

Physical resources were examined in the context of the conditions ensuring development of the republic's economy over the future period so as to take into account the need to accomplish favorable shifts toward reduction of the materials intensiveness of social production. The research which was done established the peculiarities of the variation of product materials intensiveness, determined the quantitative impact of factors (structural shifts and the specific rate of consumption of physical resources), and substantiated the prospective level of physical inputs in the gross social product. Recommendations which took this into account were prepared for industrial processing of production waste, balance computations were compiled for the most important types of physical resources and recommendations drafted for their optimum utilization, and a number of jobs were done related to providing guidance concerning methods and organization to be used in drafting norms governing consumption of physical resources. This made it possible to revise draft proposals of allowances for product consumption and to put the consumption of physical resources in capital construction on a scientific foundation.

Physical balances for 102 types of industrial and farm products were laid down as the foundation for studying the dynamic pattern, volume and structure of the republic's external relations. These balances were used in determining the growth of interrepublic deliveries and revenues, their geographic distribution, and the relative share of deliveries in the production and consumption of the given product. Rates of development of interrepublic economic exchange were as a consequence

computed in value terms for the principal sectors of the republic's economy, and the dynamic behavior of the volume of output of Departments I and II of social production was determined. These data were used in working out the future balance of the republic's social product and also in preparing recommendations for optimizing freight traffic.

Proportionality and efficiency of the republic's economic development were guaranteed by means of the balance of the economy. Within it studies were made of the balances of the social product, the subjects of labor, the means of labor, consumer goods, capital investments, working capital and reserves (zapasy). Working them out in a breakdown of the branches of material production made it possible to balance the indicators for the entire economy . . . to substantiate with technical-and-economic computations the volumes and growth rates of the gross social product, material costs, the national income, the distribution of the social product into Departments I and II and the distribution of the national income, as well as to substantiate the prospects for accumulation.

The main trends in the dynamic behavior of the gross social product, the national income and labor productivity were ascertained by means of the balance computations and the results of the analysis of the economy's development. The efficiency of the economy's development over the future period was confirmed by the increase in the size of the national income and the ponderability of each percentage point of its growth. The rise of labor productivity and reduction of materials intensiveness are the basic factor in the national income's growth.

The forecast of industry's development was worked out in alternative versions on the basis of uniform conceptions whose realization ensures steady growth of the volume of output, improvement of the production structure by industries, faster scientific-technical progress and retooling of all sectors of the economy subject to justified restrictions concerning capital investments and the size of the production work force.

An assessment of the capabilities and requirements of the USSR economy (taking into account the republic's role in the country's unified national economic complex) made it possible to determine the approximate future volumes of gross output and capital investments for each industry and the corresponding dynamic behavior of production for the industrial sector as a whole and its individual industries. These parameters were examined and linked to the volumes of production of the principal industrial products, and then they were verified by balance computations and interlinked within the framework of the industrial sector as a whole and the republic's entire economy.

The forecast of the rates, structure and efficiency of agriculture's development was compiled so as to take into account a higher level of satisfaction of the needs of the public for foodstuffs and of the industrial sector for agricultural raw materials over the forecasting period. All the alternative versions of the computations of the most important indicators were linked to financial and physical and technical resources and the principal factors of intensification.

Along with computations of the volume of production and state purchases of the principal products of plant growing and animal husbandry, factors influencing the rise of product quality and reduction of production costs were also taken up. Recommendations were drafted for intensification of specialization and for increasing the concentration of production of farm products through industrialization and interfarm cooperation. Recommendations were made for improvement of the structure of livestock feed production by making it an independent branch of agriculture, for more efficient use of livestock feed resources, for solving the problem of the shortage of protein, and for developing the mixed feed industry.

The forecast of the rise in the standard of living of the people called for work on problems related to the growth of personal income, personal consumption and services for the public so as to take into account possible resources of consumer goods and development of the nonproduction sphere. An analysis of the many-sided and diverse phenomena and aspects of the socialist way of life of the population made it possible to identify the main trends in its development. Levels of real income and consumption between families of kolхоз members and workers, among major social groups in the population, and between inhabitants of cities and rural localities have already been brought closer together and even equalized.

At the same time the inadequate development of the production of certain consumer commodities and of entire sectors and industries serving the public is giving rise to disproportions between the growth of personal income and the supply of commodities, which is resulting in a rapid growth of private money savings. To solve these problems recommendations were substantiated to improve the structure of consumption and the supply of commodities to cover the public's effective demand. Balance computations of the growth of the production of consumer goods and projections for expansion of retail sales turnover were made.

Research on the prospects for development of the economy also covered certain important questions related to improved use of raw materials and to development of particular production sectors and the entire infrastructure. The principal peculiarity of these efforts was their linkage to resource restrictions and the main final result.

Certain results were also obtained in work on a number of other comprehensive topics of a specific economic nature. At the same time the analysis showed that scientific work had not yet been done on a number of important directions. This is creating certain difficulties in working out planning solutions. To be specific, not enough research has been done on trends in reproduction of fixed capital, on the structure of outlays for reproduction, on the adequacy of the output of capital goods industries and the capacities of construction organizations and the construction fabrications industry relative to capital investments, nor on trends in the direct and relative substitution of embodied labor for resources of live labor, on optimum relationships in the development of the branches of the agroindustrial complex, etc. Research has already been organized during this 5-year period on all these problems, and this is raising a number of new tasks in furnishing the methods for that research.

The most important projects on problems concerning methodology and methods are research to devise the methods to support the ASPR [computerized system of planning computations] of UkSSR Gosplan and research on the scientific methods fundamental to comprehensive regional planning. Research in the domain of mathematical-economic methods and models is aimed above all at raising the scientific level of preplan substantiations of the prospects of the economic and social development of the Ukrainian SSR. To be specific, work begun previously to shape a system of econometric models is continuing.

A specific mathematical-economic model for purposes of balance and optimization was developed to forecast development of the economy of Ukrainian SSR and its sectors; this model combines econometric approaches in constructing the structural equations and the methods and computational procedures of the individual indicators used in present planning practice. Computations of the long-range development of the economy and its sectors and computations of the long-range balance of fixed capital were made using the model that had been developed. The impact of changes in particular parameters of the model on the values of indicators being calculated within a single system was determined. A macroeconomic normative model was also devised; it makes it possible to make computations of the dynamic behavior and structure of the most important elements of the economic potential so as to take into account possible alternative versions of the republic's economic development.

Important results pertaining to methods include development of the first phase of the ASPR and RASUNT (republic computerized system for management of science and technology), which have been accepted by state commissions and introduced into planning practice. These projects were carried out in a coordinated effort with GlavNIIVTs [(?) Main Scientific Research Computer Center], ENI? of UkSSR Gosplan and the Cybernetics Institute of the UkSSR Academy of Sciences.

Creation of the series of materials on methods for planning comprehensive development in the republic's oblasts, cities and rayons has mainly been completed. The drafting of the "Scientific Methods Fundamental to the Planning of Comprehensive Development of Regions" was coordinated by the Institute of Industrial Economics of the UkSSR Academy of Sciences. Methods have been proposed for determining specialization, the internal consistency of levels of economic development, economic structures, growth rates of net output, the productivity of social labor, labor and natural resources, indicators of the standard of living of the people, and intersector and interregional relations, and a method of compilation and forms of sectoral plans at the level of the oblast (in a geographic breakdown) have been worked out.

Study of the problem of improving the methodology of planning production efficiency was aimed at securing the possibility of planned regulation of the final results to the national economy at various levels of management of social production. In other work on this problem the methodological foundations have been worked out for evaluating, planning and analyzing production efficiency in the union republic by sectors and departments by taking into account the efficiency of utilization of production resources, acceleration of the rate of their turnover and the efficiency of production input. A method of analyzing the influence of

particular factors on the rise of production efficiency was the result of the research conducted. This method used the systems approach, which reflects the interrelationship of individual and summary indicators of production efficiency, and it provided an evaluation of the influence of their use on the final result of social production--national income.

An extensive group of interrelated projects were performed on methods aspects of the retooling of production. Procedural principles for planning the retooling of industrial enterprises were developed according to the results of that research. The basic principles of this method were extensively tried at the country's enterprises by decision of USSR Gosplan and were reflected in the "Instructions on Methods of Compiling Plans of Economic and Social Development." At the same time there is a need in connection with this program to do work on problems related to the method of substantiating the resource support of retooling, its influence on the rates and proportions of economic development, related to selection of priority lines of development, etc. Most of these topics have been scheduled for work during the current 5-year period.

One of the principal directions for solving the problems of increasing agricultural output and raising production efficiency in agriculture is to improve the planning of the operation of agroindustrial associations. In the present period the volume of production in many associations is not balanced against the land, labor and physical resources. This results in underutilization of production capacities and resources and detracts from production efficiency. The institute has done research on this problem, taking agroindustrial associations in the vegetable canning industry as an example. As a result procedural principles were worked out for optimum planning of the structure of the production and processing of farm products; they are based on use of mathematical-economic methods and up-to-date computer equipment. The studies of these methods in planning agroindustrial associations made it possible to identify the optimum variants of the production structure for differing quotas and resources. The procedural principles which were developed have been experimentally verified in compilation of plans for the development of production in the 11th Five-Year Plan in a number of vegetable canning associations of Ukrkonservprom [Ukrainian Canning Industry], located in the republic's different natural and economic zones.

The need for further improvement of planning methodology and methods has placed on the agenda the problems of structuring comprehensive target programs of various kinds and at various levels, of their interaction with the existing planning system, and of providing followup on fulfillment and management of their implementation. In order to improve regional planning and to combine it in the optimum way with sectoral planning there is a need to solve problems concerning methods of compiling and optimizing plans and balances of the production of consumer goods, of development of the infrastructure, of optimum utilization of labor and natural resources, and of environmental protection. Considerable attention should be paid to the methodology of normative planning of economic and social processes, including plans on a regional basis.

Efforts to use the methods of mathematical economics to substantiate optimum variants of the plan and to improve the planning and management of various programs

and processes will undergo further development in the current 5-year period. There will be substantial expansion and intensification of research to create the methods to support computerized planning systems within the framework of the second phases of the ASPR, ASPRO [expansion unknown], and RASUNT.

V. V. Shcherbitskiy pointed out at the 26th Ukrainian CP Congress that attention must be concentrated on identifying and activating all available potential to eliminate bottlenecks. He emphasized that this effort should be conducted systematically, in a planned manner, so that the plan becomes the principal instrument for bringing the reserves that exist into production and for efficient utilization of all production resources. The science of economics is expected to take an important place in this important effort. Research should be systematically conducted to identify unused production potential and to substantiate methods and strategies of putting it to optimum use. This work must be done in the preplan stage so that its results are reflected in national economic plans. Research to improve the methodology and economic analysis, data support, data processing methods, etc., are assuming great importance in connection with the tasks of identifying and utilizing unused production potential.

In the report address of the CPSU Central Committee to the 26th party congress L. I. Brezhnev emphasized that "... utilizing the opportunities which we have depends in large part on the level of leadership of the economy and on the level of planning and management." Scientific work on the problems of improving planning and forecasting and furnishing planning agencies scientifically sound recommendations to raise production efficiency, to make economic development more balanced and to perfect the scientific instruments of analysis, forecasting and planning constitute one of the chief tasks of the science of economics in the present stage.

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PLANNING AND PLAN IMPLEMENTATION

FORECASTING TECHNIQUES IN ECONOMIC PLANNING DISCUSSED

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[Article by G. N. Zoteyev, Moscow; submitted 4 Dec 80]

[Text] The "Basic Directions of the USSR's Economic and Social Development in the Period 1981-1985 and to the Year 1990" have set the task of consistently improving the management of the economy so as to take into account the larger scale of production, the increasingly complex economic relations, and the requirements of the scientific-technical revolution in the aim of maximum utilization of the capabilities and advantages of the economy of mature socialism. The regular working out of forecasts is becoming an organic stage in the planned management of the socialist economy, one that is followed by determination of the principal parameters of the country's socioeconomic development and scientific-technical development over the planning period.

The objective need to work out forecasts in the context of the socialist economy has arisen primarily because of the enormous growth of the potential capabilities of scientific-technical progress, because of the augmented role of social factors in contemporary social production, because of the emergence of ecological and natural constraints, because of the national economy's strengthened ties with the trends of the world economy, and because of other circumstances.

More accurate prediction of the future is becoming especially important to socialist planning now when economic relations have become much more complex, the scale of production has grown sharply, the interaction of all aspects of development has broadened, and current planning decisions have become more dependent on future consequences.

The working out of forecasts comprises the initial stage of multiannual analytical and planning computations, which are followed by the shaping of long-range and medium-term economic plans and comprehensive target programs. The "relay race" of planning computations moves along a route that is dictated by the general content and logic of socialist planning: forecast--problems--programs--plans--priority measures. In the broad sense, then, improvement of planning presupposes further development of the principles, methods and organization of the compiling of forecasts.

1. Content, Functions and Structure of Forecasts

The principal content of forecasting is the qualitative and quantitative analysis of demographic, ecological, socioeconomic, scientific-technical, foreign economic, and other processes; identification of the objective conditions, factors, trends and restrictions of the future; the timely determination of the character and scale of the tasks and difficulties which will confront society and the economy before the planning period; exploration of alternative versions of the growth of production and consumption, and assessment of the likelihood of their realization.

The forecasting system interacts with planning and management along three very important lines depending on whether the forecast:

- i. precedes the plan, whereby it is a preliminary stage of its drafting;
- ii. supplements the plan with respect to those processes which cannot be covered by planning in the precise sense of the word and points up their possible consequences within the planning period;*
- iii. is a form of following up on realization of planning targets through assessment of the most probable limits of the degree of the plan's actual overfulfillment or underfulfillment and determination of the corresponding social and economic results.

The leading function of forecasting in the system of national economic planning is to lay the foundations for adoption of managerial and planning decisions in the form of scientific analyses and the prerequisites for such decisions. The following can be classified among those prerequisites and at the same time as partial functions of forecasting:

- a. quantitative and qualitative analysis of past trends in economic development, identification of the causes of bottlenecks;
- b. determination of those lines of development and "growth points" where it is advisable to concentrate resources (resursy i sredstva);
- c. prediction of the prospects of the economy on the basis of probability and alternatives so as to take into account both existing directions and the emergence of additional restrictions and possibilities, as well as requirements and goals set previously or arising for the first time;
- d. evaluation of the limits of capabilities and of alternative versions of the consequences of an active influence on the processes and trends being predicted,

* For example, demographic processes, the influence of the natural factor, the terms of world trade, the scale of production in private subsidiary farming, changes in the structure of demand because new fashion trends are generated, and other important lines of development are not planned as such, but the consequences of these autonomous processes should if possible be taken into account in the plan. In practice this is done on the basis of forecasts.

substantiation of the basic lines of demographic, ecological, social, economic, scientific-technical, regional and foreign economic policy.

Forecasting must be comprehensive if it is to serve as the scientific basis for the drafting of national economic plans and comprehensive target programs. In the USSR a nationwide forecasting system is about to be set up with its appropriate organizational forms and forecasting methods compatible with the system of planning and management. The following relatively independent lines of forecasting will be included in it as components. the demographic line; natural resource utilization and protection of the natural environment; the social line; the economic; the sectoral; the regional; the scientific-technical; and development of the world economy and international relations.

Interaction of the autonomous lines of forecasting takes place through reconciliation of ideas, exchange of information and performance of a series of iterative multiannual computations within the framework of the comprehensive national economic forecast. Its principal purpose is mutual balance and functional linkage of the most important aspects of development and representation of key generalizations in the form of aggregated indicators (see Figure 1). The comprehensive national economic forecast is both the point of departure for compiling the comprehensive program of scientific-technical progress over the 20-year period and comprehensive national economic target programs (fuel and power, food, modernization of plant and equipment of heavy industries and development of machinebuilding, transportation), as well as the final stage of their creation.

In the preliminary stage of drafting comprehensive national economic target programs (including the comprehensive program of scientific-technical progress over the 20-year period along with the fuel and power, food and other programs), when an integral and orderly conception for solving the particular program is still lacking, the initial version of the comprehensive national economic forecast is compiled for the period of 20 years with a breakdown by 5-year periods. It takes into account the preceding comprehensive program of scientific-technical progress, forecasts of population growth, of the reproduction of natural resources, trends in world economics and trade, the most recent partial scientific-technical forecasts, and planning and other materials covering the next 10 years which reflect the prospects for growth and structural changes in the national economy.

One of the functions of the national economic forecast in the preliminary stage of drafting the comprehensive 20-year program of scientific-technical progress is to formulate the tasks to be adopted as targets. The process of compiling the comprehensive 20-year program of scientific-technical progress has a certain inherent logic which is dictated by the overall relationship among the goals, resources and restrictions. This logic consists in first outlining the main goals and restrictions over that period and then seeking the ways and resources of attaining or overcoming them.

External constraints on development of the national economy, science and technology are operative first of all in the domains of reproduction of population and natural resources, trends in growth of the world economy, imports and exports, and other analogous factors. They are identified by means of the following

forecasts: demographic, reproduction of natural resources and the ecological situation, and the dynamics of the world economy and trade.

The long-range and immediate final goals of scientific-technical progress are shaped by working out a system of partial social and economic forecasts, which are primarily normative in nature. The social forecasts demonstrate the need to attain a particular "given" level in the domain of prosperity, the structure and differentiation of income, the system of health care and education, workplace health and safety and environmental protection, etc. They should reflect alternative versions and priorities as to the lines and strategies of all-round development of the personality and improvement of the socialist way of life, and they should define the content of the social problems socialist society could encounter in the future.

The economic goals of scientific-technical progress are defined and its trends identified by preparing long-range, medium-term and short-term partial economic forecasts. Their principal function lies in ascertaining the physical and capacity restrictions. The main thing in the economic forecasts in the preliminary stage of compiling the comprehensive 20-year program of scientific-technical progress is to determine the limits of the growth in the scale of the physical volume of production resources (labor resources, the fuels and raw materials, and investment resources above all) and their most important structural components.

Key to Figure 1:

1. Forecasts
2. Demographic
3. Reproduction of natural resources and the ecological situation
4. Social
5. Economic
6. Sectoral
7. Scientific-technical
8. Regional
9. Development of the world economy and international relations
10. Comprehensive program of scientific-technical progress over the 20-year period
11. Comprehensive national economic forecast
12. Draft of the main lines of the USSR's economic and social development over the 10-year period
13. Draft of the 5-year plan of the economic and social development of the USSR's national economy
14. Comprehensive national economic target programs (fuel and power, food, modernization of heavy industries and development of machinebuilding, and transportation)
15. Comprehensive target programs for solving the most important social, economic, ecological, scientific-technical and regional problems of development

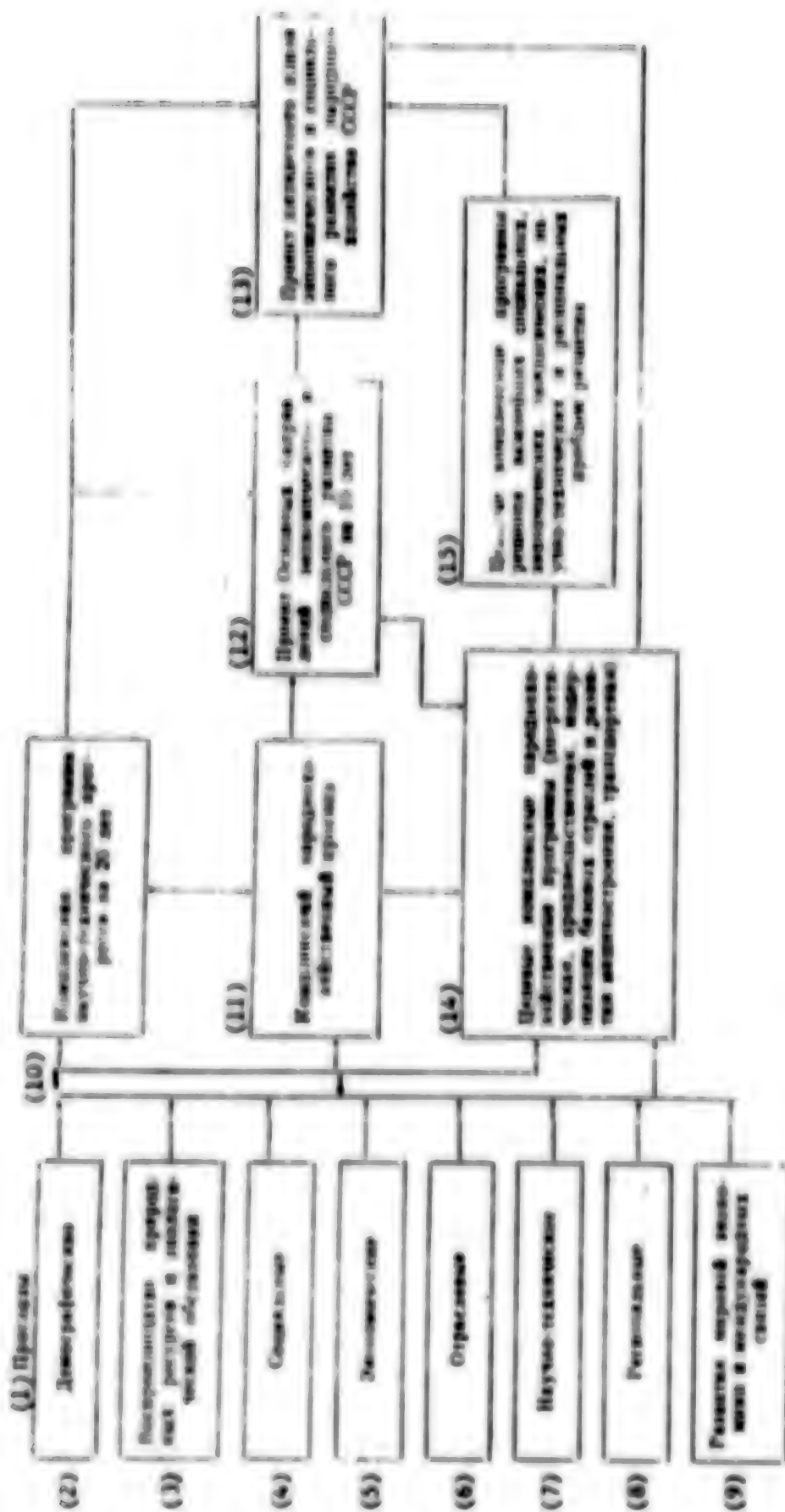


Figure 1. The forecasting system and its ties with planning.

It is indispensable to orient scientific-technical progress purposefully toward overcoming the restrictiveness of production resources from the standpoint of satisfying the reasonable final needs of society. There are four ways in which scientific-technical progress exerts its impact depending on which aspect of the conservation of these resources is predominant: labor saving, capital saving, materials saving and energy saving. The priority of a particular form needs to be discovered even in the preliminary stage of drafting a comprehensive program for setting up a kind of forecast system of ceilings on employment, capital investments in construction and installation work, on volumes of extraction of primary natural raw materials and mineral fuels, etc.

The principal resources and capabilities for attaining social and economic goals and the principal ways of overcoming the demographic, ecological, natural-resource and other objective restrictions of the future are to be found in the domain of accelerating scientific-technical progress, of intensifying structural shifts in production and consumption of physical resources and in improvement of the economic mechanism and management of the economy. Analysis, future-oriented computations and substantiations of these aspects are the content of the comprehensive 20-year program of scientific-technical progress.

The decree of the CPSU Central Committee and USSR Council of Ministers dated 12 July 1979 and entitled "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality" has stated that the USSR Academy of Sciences, the USSR State Committee for Science and Technology and USSR Gosstroy shall draft the comprehensive 20-year program of scientific-technical progress (by 5-year periods) and shall submit it to the USSR Council of Ministers and USSR Gosplan no later than 2 years before commencement of each successive 5-year period. The necessary supplements and provisions shall be made in the comprehensive program every 5 years, and it is compiled to cover a new 5-year period.

The decree says that this program shall precede and serve as a point of departure for USSR Gosplan's drafting of the proposed version of the main lines of the USSR's economic and social development over the 10-year period on the basis of the long-range socioeconomic tasks defined by the party.

Work was done in the 1976-1979 period to compile a comprehensive program of scientific-technical progress up to the year 2000. More than 15 of the country's leading scientists and specialists from nearly 300 research institutes of academies and sectors and industries took part in it under the general supervision of the Presidium of the USSR Academy of Sciences and the USSR State Committee for Science and Technology. The Scientific Council of the USSR Academy of Sciences for Problems of Scientific-Technical and Socioeconomic Forecasting is the actual organizer of the drafting of the comprehensive program and of improvement of its methodology and methods.

This program serves as an integral part of the current and long-range planning and as the basis for selecting the directions of the unified scientific-technical policy in our country.

Its most important tasks are these:

- i. substantiation of priorities along the individual lines of development of science and technology and a future assessment of the possible scale of introduction of the advances of scientific-technical progress;
- ii. assessment of its probable socioeconomic consequences, expressed above all in indicators of the growth of efficiency and of the intensity of structural shifts, as well as in the solving of social problems;
- iii. substantiation of the need for and basic elements of scientific-technical target programs;
- iv. distribution of physical, labor and financial resources along the lines of scientific-technical progress.

The comprehensive 20-year program of scientific-technical progress is drafted in two stages. In the first (preliminary) stage a system of partial and comprehensive long-range, medium-term and current scientific-technical and socioeconomic forecasts is set up, and this in turn presupposes analysis of existing trends and problems and assessment of the possible level of fulfillment of the initial 5-year plan; the initial version of the USSR's economic development over the 20-year period is shaped in the form of a general comprehensive national economic forecast in which only the main goals, resources and restrictions of the future are set forth, and specific lines of scientific-technical progress are not taken under consideration.

In the second (final) stage the ultimate document is drafted. In this case the comprehensive national economic forecast summarizes the sectoral and partial aspects of scientific-technical progress and describes alternative versions of the balanced growth of the national economy over the 20-year period so as to take into account the impact of scientific-technical progress. Thus the comprehensive national economic forecast has important methodological significance in substantiating the prospects for socioeconomic and scientific-technical progress. Below we shall examine the structure and methods of compiling it; they reflect both the practical experience acquired in applied forecasting in the USSR as well as the new tasks of improving it in the light of the altered conditions of reproduction.

2. The Logic and Methods of Preparing the Comprehensive National Economic Forecast

In order to substantiate the indicators of socioeconomic development in the comprehensive 20-year program of scientific-technical progress partial and comprehensive socioeconomic forecasts are prepared; the list of them and their content are determined by the makeup and nature of socioeconomic processes. These forecasts are summarized and linked so as to take into account the impact of scientific-technical progress, population growth, the natural factor and other phenomena exogenous to the economy in the summary socioeconomic forecast, which comprises the backbone of the comprehensive national economic forecast.

The entire set of forecasts is broken down into partial forecasts, comprehensive forecasts and summary forecasts. For example, depending on the level of aggregation the comprehensive socioeconomic forecasts include a macroeconomic forecast, a structural (intersector) forecast, a forecast of the development of intersector production complexes and finally, a forecast of the development of sectors.

The overall logic and method of structuring the socioeconomic forecast takes into account the augmented role of the macroeconomic forecast both in the preliminary stage and also the final stage of drafting the comprehensive 20-year program of scientific-technical progress and other documents reflecting the long-range aspects of the USSR's economic development (fuel and power, food, transportation, the program for modernization of heavy industries).

The present methodology of future-oriented computations and for compiling forecasts presupposes that one will first undertake detailed sectoral, regional, scientific-technical and other forecasting procedures and that one should first devise an initial version of the economy's development which reflects both the strategic socioeconomic tasks of the forecasting period as well as the limits on the real possibilities of the growth of production resources and socioeconomic requirements concerning the level and dynamic behavior of their efficiency.

Working out the basic national economic indicators in consolidated form on the basis of the macroeconomic model presupposes parallel and counterfunctional and sector socioeconomic forecasts. The sectoral computations are summarized and the results of the macroeconomic forecast concretized and unified with forecasts of the development of the intersector production complex and of individual sectors of material production within the framework of the structural (intersector) forecasts. It includes a future-oriented assessment of the differentiation of growth rates of particular sectors so as to take into account the sectoral distribution of employment and capital investments and also the forecast of the general material conditions for maintaining intersector balance and identification of possible locations of imbalance and discrepancies in the dynamic behavior of the sectors.

Forecasts of the development of intersector production complexes cover such complexes as fuel and power, building materials, investment, the agroindustrial complex and the production infrastructure.

Forecasts of the prospects of the major national economic production complexes make it possible to discover the correspondence among the general indicators of the rates, proportions, structure and efficiency of development of the entire economy and the specific features of individual spheres and segments of the national economy and to determine those supplemental socioeconomic requirements as to the rates and directions of scientific-technical progress which are indispensable to satisfying the final needs of society within the restrictions on the growth of the volume of production resources in the future.

The principal aim of the sectoral socioeconomic forecast is to dovetail it with the scientific-technical forecast. It is in the nature of the sectoral forecasts that they are primarily concerned with capacities and resources, technical-and-economic aspects and production itself. They must reflect probable pathways of

scientific-technical progress and the scale and depth of its accomplishment in output, engineering and technology in the organization of work and the organization of production, and in shifts of the intrasector production structure. The sectoral socioeconomic forecast is used for quantitative determination of the most important results and consequences of scientific-technical progress, which are expressed in the indicators of the economic efficiency of production--specific capital investments, labor productivity, and the consumption of raw materials and energy per unit output.

The existence of various aspects of socioeconomic reproduction necessitates the preparation of comprehensive forecasts along functional lines: of personal income and consumption; of development of the branches of the nonproduction sphere; of the employment of the population and of labor expenditures; of capital resources; of optimum utilization of natural resources; of the socioeconomic prerequisites and consequences of scientific-technical progress; of foreign economic relations and trends of world commodity markets; of the economic mechanism for the conduct of economic activity and of the management and planning systems. These forecasts are mutually reconciled and figure as a unified whole in compiling the socioeconomic forecasts at various levels of aggregation and in preparing the summary economic and national economic forecasts.

The structure of the partial, comprehensive and summary socioeconomic forecasts can also be described from the time-frame standpoint. Short-term (less than 2 years), medium-term (up to 7 years) and long-range (up to 20 years) socioeconomic forecasts are distinguished in accordance with generally accepted ideas. Their content, principal functions and methods of compilation are determined by the nature and structure of the social and economic processes being forecast.

The short-term forecast is above all an assessment of the course of fulfillment of the annual and 5-year plans, of current economic processes related to fluctuations in agricultural production, to the movement of financial flows, to changes in the structure of effective demand of the population and of conjuncture on world commodity markets, to unexpected and short-term bottlenecks in the economy, and so on. It is the task of the short-term forecast to substantiate and revise the initial basis for multiannual computations of the principal indicators of economic development.

The medium-term forecast is concerned with determining the proportions and sectoral structure of material production, of balances of production and consumption of basic physical resources and the degree of the strain on them, the level of the physical and financial balance in the domain of capital construction, and production and sales of consumer goods. The aim of the medium-term forecast is to determine the conditions for balanced intersector development, to identify the principal points of imbalance and their causes, to analyze the course of fulfillment of long-range target development programs and to discover directions in which they should be adjusted.

In the long-range forecast emphasis is on demographic processes, forecasts of reserves of minerals and economic employment of natural resources, the scale of the social problems of development and prospects for their solution, evaluation of the

potential capabilities of fundamentally new lines of scientific-technical progress, and so on. Its purpose is to predict new goals and restrictions of socioeconomic development and to evaluate the real possibilities and limits of scientific-technical progress.

The comprehensive socioeconomic forecasts are linked together as a whole and reconciled with one another so as to take into account the time frames of forecasting in the summary national economic forecast. Its principal purpose is to substantiate the principal indicators of development of the USSR's national economy over the 20-year period (broken down into four 5-year periods) on the basis of the comprehensive scientific-technical and socioeconomic forecasts. The summary forecast, which is prepared so as to take into account the socioeconomic consequences of scientific-technical progress, presupposes an analysis of the following most important problems and lines of development of the national economy over the long-range and medium-term periods: the socioeconomic tasks of the long-range period; the trends of economic efficiency and the principal material factors of future expansion of production; growth rates and factors of social production and distribution of the final social product and use of the national income; directions in which the structure of production is changing and problems of the intersector balance of production; the dynamic pattern and structure of personal consumption and development of the nonproduction sphere, ways of attaining the optimum level and structure of average per capita consumption and of consumption for each member of socialist society; the present situation and development trends of the most important intersector production complexes (fuel and power, building materials, investment, the agroindustrial complex, and the production infrastructure).

The various sections of the summary national economic forecast are coordinated with one another to make up a sequence of future-oriented computations (Figure 2). The first indicators to be computed are those characterizing attainment of the optimum level and composition of personal consumption. On the basis of a summarization of the scientific-technical forecasts economic efficiency (labor productivity, specific capital and current material costs) is determined over the long-range period. Parallel computations are made of the most likely scale of growth of labor, physical and capital resources arising out of the forecasts of the population growth, the growth of natural resources and the reproduction of fixed capital and capital investments. In the computations over the medium-term future period restrictions related to possibilities of the growth of production capacities in metallurgy, the fuel and power industry, and capital construction and the growth of the volume of production in agriculture are given separately.

The various sections of the summary national economic forecast are linked to one another in balances and functionally by means of alternative versions in which each alternative of development is characterized by a system of mutually consistent indicators. The principal difficulty in this mutual adjustment is that for every overall alternative one must determine in each segment of the summary forecast indicators which correspond not only quantitatively, but also in content and quality to the type of socioeconomic and scientific-technical development inherent in that alternative period.

As a rule the summary national economic forecast is prepared in three alternative versions.

The first (lower) variant is based on the hypothesis of retaining the existing type of development and growth trends of production efficiency (labor productivity, the efficiency of capital investments and fixed capital, and materials intensiveness). From the standpoint of structural shifts, the efficiency of production resources and scientific-technical progress, it is predominantly an extensive version. Extrapolation models and computations usually figure as the methods of substantiating it. The lower extrapolation variant should be distinguished from the minimum variant, which is arrived at through computation by the methods of mechanical extrapolation of adverse tendencies of production efficiency that have taken shape in the past. But in the scale of development and rates of development the minimum variant is lower than the extrapolation variant and does not carry a specific burden of meaning except as a kind of admonition, describing as it does a possible dead end in economic development if the trends of the past are precisely repeated in the future. This variant can be used as an illustration pertaining to the various partial and comprehensive forecasts.

The second (middle) variant is based on the hypothesis of the possibility and necessity of speeding up scientific-technical progress, of intensifying structural shifts and--on that basis--of altering and improving present trends. It presupposes a gradual transition to the predominantly intensive type of economic growth and the favorable impact of organizational factors and the economic mechanism toward raising production efficiency; it is the most likely from the standpoint of a realistic reckoning of the anticipated conditions for speeding up scientific-technical progress, and it is therefore regarded as the principal version.

The third (upper) variant reflects the rates, structure and efficiency of production required for attainment of the optimum level and structure of personal consumption by the given deadline and for performance of the most important long-range social tasks. It is regarded as the most desirable, since its fulfillment guarantees the fullest satisfaction of the reasonable needs of society. But the realism of this version, if it is compared with the others, is ordinarily less substantiated from the standpoint of the economic capabilities of scientific-technical progress and the efficiency of production resources. Its task, then, is above all to define social requirements as to the scale, structure and efficiency of production and as to the rates and forms of scientific-technical progress. It is as a consequence sometimes referred to as the target version.

The actual work of preparing the forecast is inseparably bound up with the models, data and computational methods of mathematical economics. The models of socioeconomic forecasting, depending on the level of aggregation, are divided into macroeconomic models, used to forecast summary indicators of reproduction; structural models--these are used to forecast the production structure and also intersector and interregional relations and the distribution of primary production resources among the country's sectors and regions; while the sectoral and regional models of the forecast serve the needs of analysis and future-oriented computations of sectoral complexes and regional industrial complexes.

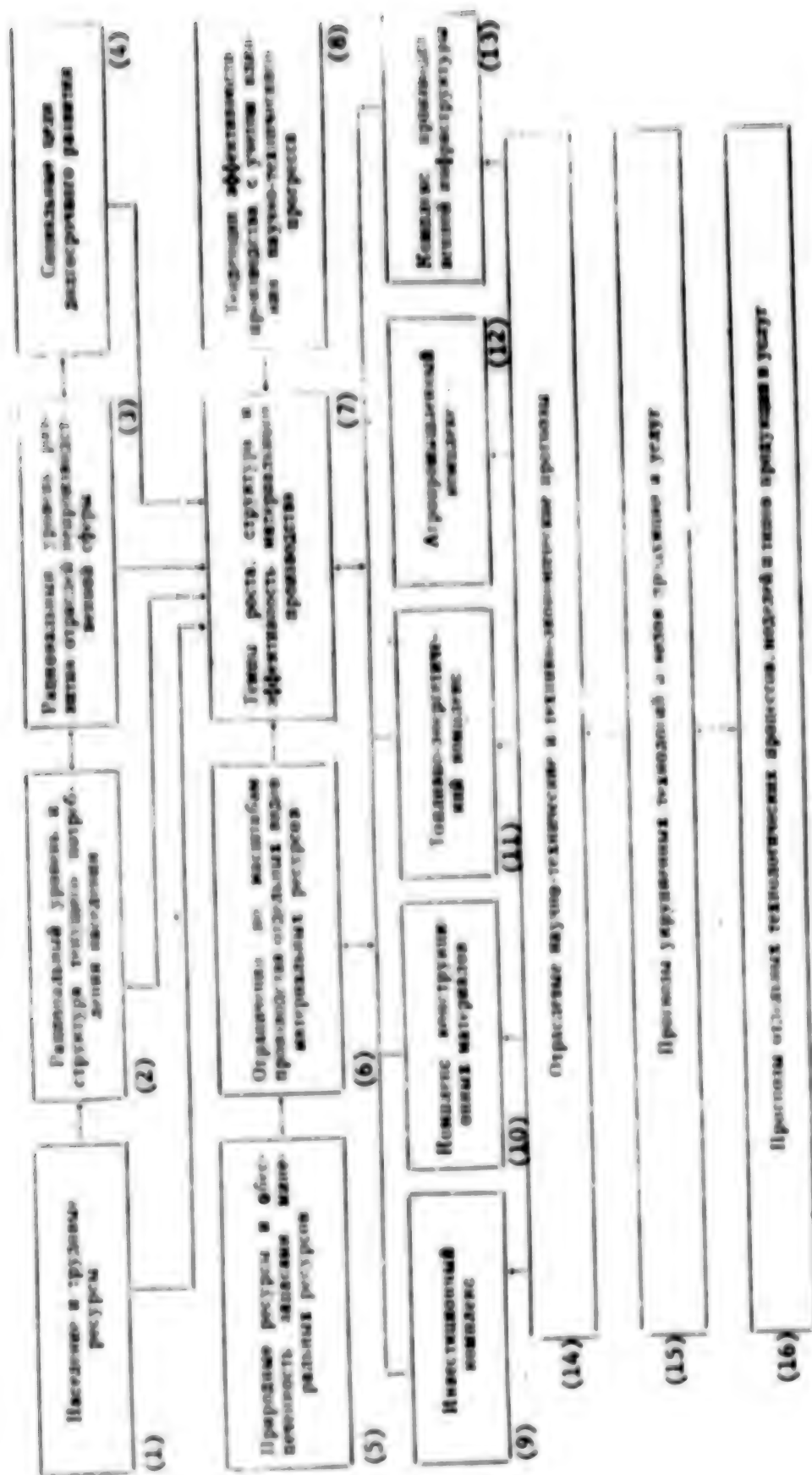


Figure 2. Sequence followed in computing indicators of socioeconomic development in the summary national economic forecast.

Key to Figure 2:

1. Population and labor resources
2. Optimum level and structure of current personal consumption
3. Optimum level of development of the branches of the nonproduction sphere
4. Social goals of long-range development
5. Natural resources and the adequacy of reserves of mineral resources
6. Restrictions on the scale of production of particular types of physical resources
7. Growth rates, structure and efficiency of physical production
8. Trends in production efficiency in the light of the influence of scientific-technical progress
9. Capital investment complex
10. Building materials complex
11. Fuel and power complex
12. Agroindustrial complex
13. Complex of the production infrastructure
14. Sectoral scientific-technical and technical-and-economic forecasts
15. Forecasts of consolidated technologies and products and services
16. Forecasts of individual manufacturing processes and models and types of products and services

A set of functional models making it possible to work out forecasts of reproduction of labor, natural and capital resources, of personal income and consumption, of the dynamics and structure of exports and imports, and so on, is prepared in accordance with the targets, production resources, foreign economic relations and other aspects of forecasting.

The macroeconomic and structural models are the best-known forecasting models. Their best-known types are multifactor models of economic growth, models of distribution of the final social product into its component elements, and the model of intersector interaction and its various modifications.

The principal difficulty arising as to method in the process of practical use of forecasting models lies in unifying them into an integral and interrelated system of models founded on a uniform data and computational base. The most promising directions in the creation of such a system may be the "modular" principle of building mathematical-economic models and the transition to the interactive mode of data processing.

Preparation of the summary national economic forecast comprises one of the stages in substantiating the lines of development over the long-range and medium-term periods. The principal results of interaction of the goals, restrictions and possibilities of socioeconomic and scientific-technical development are taken into account within the summary forecast, and the principal problems and factors which speed up and restrain dynamic and proportional growth of production and consumption are identified. The main contours and fundamental approaches to performing the tasks of the future defined by the system of forecasts are outlined at the same time. For that purpose a list is drawn up of the most important problems for which drafts are written of the most important principles of socioeconomic,

ecological, regional, scientific-technical and other types of target programs. This list, including certain general cost and benefit indicators, makes it possible for planning agencies to select with more confidence the priority lines of scientific-technical and socioeconomic development, which assumes great practical importance in the context of an overall slowing down of the dynamics of production resources.

3. Alteration of the General Conditions of Reproduction and the Tasks of Forecasting

The change in the general conditions of reproduction is represented in greatest relief in analysis of the following segments of the economic system:

- i. the social needs of society and also the social restrictions and factors of economic growth;
- ii. production resources and the principal elements of their dynamic behavior;
- iii. the main directions of intensification of social production, scientific-technical progress and structural shifts in the production and consumption of physical resources.

Solving key social problems has always been at the center of strategic goals of socialist society. Enhancement of the role of social tasks as the main reference point for development of the economy and for the dynamics of scientific-technical progress is becoming a most important peculiarity of reproduction in the coming period.

The increasing significance of social factors is not only the determining reference point for development of the Soviet economy, but also a decisive condition for the rise of production efficiency, especially in agriculture, construction, light industry and other sectors where the limiting influence of the quality and structure of labor resources is manifested on the scale of production and assortment of products, on utilization of production capacities and on the level of technological discipline.

The initial material prerequisite for solving the main social problems is balance growth of the consumer sector, whose principal aspects are the following: worker income and personal income and their differentiation; personal savings and their functional structure; domestic production of consumer goods and their movement through distribution channels; the volume and structure of paid services rendered to the public; imports of finished consumer goods and their movement through distribution channels; prices of consumer goods and rate schedules for services, average retail market prices and retail list prices being given separately.

Consistent implementation of the socialist principle of distribution according to work and balanced development of the consumer sector of the economy require that the forecast of the latter's dynamic behavior and structure include both an autonomous forecast of its main directions and also their mutual linkage on a balance sheet. Future-oriented computations of the dynamic behavior and structure of

the "natural" growth of personal money income, determination of the priority tasks in optimizing consumption and also the scale of coverage of the socially necessary minimum of deferred demand, which can be regarded as the corresponding part of the total money savings accumulated by individuals, move into the foreground here. These three components of demand will determine the minimally necessary requirements with respect to growth of the physical volume of consumer goods and services, which must be backed up by a growth of physical production and expansion of the sphere of services in the forecasting period.

The inadequate level of concrete applied projects in the field of the most important aspects of social forecasting (such as future-oriented assessments of the size of the group of indigent families, computations of possible growth rates of the "natural" growth of income, substantiation of the lines and scale of the socially necessary optimization of consumption, an approximate estimate of the share of deferred demand in total personal savings, and so on) is seriously hampering forecasting computations of the dynamic behavior and structure of consumption and is detracting from the value and topicality of many recommendations in the policy of social priorities. Concentration of the efforts of those preparing the national economic forecast on the problems of social development is one of the areas for improvement of the methodology of multiannual preplan computations that needs to be utilized more extensively.

Analysis and future-oriented analytical computations show that the principal physical restrictions on the long-range economic growth of the USSR are determined by the conditions and peculiarities of reproduction of labor, natural and capital resources as well as by the predominance of the extensive forms of development of a number of lines of science and technology.

The change of the demographic situation in the sixties, exhaustion of the labor supply in the household and private subsidiary farming, the rise in the share of the able-bodied population attending school fulltime, and the growing needs of the nonproduction sphere--all these factors predetermine stabilization of the size of the labor force in material production over the next 5-year period and more distant future. Restrictions imposed by labor resources will be more pronounced than ever in the 1981-1990 period. This is because those born in the 1961-1970 period will be reaching working age during those years, and the generations born in the period 1926-1935 will be reaching retirement age; the 1941-1945 war did not have the impact on their numbers as it did on those born before 1925. It has been determined on the basis of demographic computations that the average annual growth rates of labor resources will be dropping over the next 20 years to a fraction of the present growth rates. Thus in the 1981-1990 period the exogenous nature of the formation of the sectoral and regional structures of employment will be more pronounced, and that will tend to intensify the social factors and motives that have an impact on the characteristics of employment and labor resources. With respect to the applied aspects of forecasting, this means that distribution of manpower among sectors and regions needs to be linked above all to social factors rather than economic factors, as was the case earlier.

The USSR's economic development is greatly influenced by the natural factor, the components of whose "adverse" dynamic behavior are the following: systematic

deterioration of mining-geology and regional conditions for the extraction and shipment of natural industrial raw materials and mineral fuel; reduction of the useful components per unit of the raw natural raw material and mineral fuel; the continuing sizable proportion of farmland and plowland in zones of "critical" agriculture, where total annual precipitation does not exceed 400 mm; the limiting effect which water resources are coming to have in certain regions on the growth of industry and agriculture; intensification of ecological restrictions on economic development and maintenance of a strained balance between the scale of natural resource utilization and the volume of current costs and capital outlays for natural conservation measures.

One of the urgent problems in forecasting consists of economic assessment of the natural factor, which is expressed in indicators of the scale of production in the extractive industry and agriculture, as well as in terms of the volume of capital investments to ensure "neutralization" of the natural factor. The great astringency of ecological requirements in the forecasting period necessitates fuller consideration to ecological restrictions and their translation into the language of economic consequences.

Speeding up the rise of labor productivity, mechanizing manual labor, overcoming the adverse effect of natural conditions, and "economization" of scientific-technical progress and other factors enhance the practical importance of the forecast of reproduction of capital resources. The dynamic pattern of their physical volume depends above all on the state of affairs in capital construction, where there are still causes having a restrictive effect on the absolute growth of capital investments. They include the following: attainment in the USSR of the world's highest absolute volume of capital construction of production facilities and the need for their further growth along with a slowing down of the growth of the final social product and construction and installation work; the continuing scattering of capital investments and lengthy construction times and protracted attainment of rated output at new capacities, which lowers the rate of dissemination of new technology in industries and production groupings; the higher cost of new technology (per unit of effective benefit) and the rise of the estimated cost per square meter of production area, which, given the drop in growth rate of capital investments in production facilities, could result in stabilization or even a drop in the volume of capacities put into service; intensification of the impact on the volume of construction and installation work imposed by restrictions originating both in the regional distribution of the capacities of construction and installation organizations and also in the metal intensiveness per million rubles of construction and installation work.

All of this could result in a slowing down of the relative growth of the physical volume of capital investments. We should at the same time expect an expansion of the impact of factors which tend to augment demand for capital investments; further movement of construction eastward, to the northern regions of the European part of the USSR, and to southern mountain regions which have high seismic activity; continuing absolute and relative growth of capital outlays in the extractive industry in order to compensate deteriorating conditions as to the location and extraction of raw materials; the continuing high share of capital investments in agriculture; the need for large additional outlays for environmental protection;

special investments to mechanize laborious processes in industries with difficult and harmful working conditions; a rise in the share of investments to develop transportation and other branches of the production infrastructure.

Capital resources and scientific-technical progress are the most dynamic factors of economic growth. Forecasting investment capabilities and requirements, taking into account their factors and restrictions, and the interrelationship with other resources--these are the most urgent problems in forecasting reproduction of capital resources. The forecast of investment capabilities is taking on decisive importance in the medium-term period, while in the long-range period the principal emphasis is shifting to the problems of evaluating investment requirements.

The basis for overcoming resource restrictions are speeding up scientific-technical progress and increasing the intensity of structural shifts. Present trends in scientific-technical progress are characterized by a number of phenomena which could slow down the growth of the economic efficiency of advances of science and technology. They include the following: the relatively high share of extensive forms of scientific-technical progress in the production of machines and equipment, an expression of which is the constant growth of unit capacities for a number of products, their attainment of "Cyclopean" dimensions and their approach to threshold values beyond which no essential saving is any longer observed in capital outlays, labor expenditures, metal, fuel and other types of physical resources; orientation of scientific-technical progress in agriculture toward capital-intensive strategies for increasing the yield and productivity (mechanization, reclamation, chemicalization, construction of barns for livestock raising, and industrial livestock feed production) and the inadequate correlation between scientific-technical progress and "biologicalization" of agriculture (selection, seed growing, breeding, crop rotation, new methods of applying fertilizers, biological and genetic methods of controlling plant and animal pests and diseases, production of plant and animal growth stimulators, production of synthetic foods and so on); and in a number of cases a lag in developing new technologies for more thorough processing of primary natural raw materials and mineral fuels.

The forecast of scientific-technical progress presupposes determination not only of its potential capabilities, but also of the restrictions and limits that are occurring. Identification of bottlenecks in scientific-technical policy and structural policy must be the point of departure for forecasting scientific-technical progress in the first stage. Later this will make it possible to draw up a list of scientific-technical problems, which means that the approximate makeup of comprehensive scientific-technical target programs can be outlined.

The "Basic Directions of the USSR's Economic and Social Development in the Period 1981-1985 and to the Year 1990," adopted by the 26th party congress, points out the necessity for planning to guarantee correct determination of the order of priority of tasks and to select the most effective ways of attaining high results from the standpoint of the national economy. One of the most important prerequisites of correct determination of priorities in socioeconomic and scientific-technical development is the soundness, reliability and accuracy of forecasts. The experience acquired in the field of forecasting by our own country and the other socialist countries demonstrates that extensive and consistent use of the results of

forecasts in compiling national economic plans raises the scientific level of their substantiation, makes it possible to take more fully into account the complexity and diversity of real processes and problems of development, whose impact is part of the context of the planned and gradual growth of the socialist economy.

Forecasts, programs and plans are stages in a single process of managerial decisionmaking. Their practical realization is ensured both by the soundness of the planning assignments and also by creation of the conditions for their practical fulfillment. The eighties will be a new stage in the consistent accomplishment of the economic strategy of the CPSU--to guarantee a steady rise in the material and cultural standard of living of the people, to create better conditions for the all-round development of the personality on the basis of a further rise in the efficiency of all social production, a rise in labor productivity and greater public and work involvement of the Soviet people.

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PLANNING AND PLAN IMPLEMENTATION

COORDINATION OF INTERSECTORIAL TIES EXAMINED

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[Article by A. R. Leybkind and B. L. Rudnik: "Methodological Aspects of the Distinction of Intersectorial National Economic Complexes"]

[Text] The need to distinguish intersectorial national economic complexes as objects of planning poses the problem of identifying the ties between sectors and works, which give rise to the need to solve the problems of coordinating their development. In the article, suggested lists of such ties are analyzed and their billevel classification, which is used in research on distinguishing systems of complex intersectorial planning, is constructed.

The distinction of intersectorial national economic complexes as objects of planning presumes the solution of a wide range of problems concerning improving the organization and drafting of plans for economic and social development [1]. Among these problems the questions of identifying and evaluating the ties between sectors and works, on the basis of which the intersectorial national economic complexes should be formed, occupy an important place. At present along with ties through the community of the used raw materials and materials, the purpose of the products, the technical base and the technological processes (that is, the ties, on the basis of the evaluation of which the sectors are distinguished) other ties, the more complete consideration of which during the compilation of the indicated plans is becoming more and more urgent, are developing intensively between works. Thus, the accurate and complete specification of the types of these ties is a necessary condition of the formation of intersectorial national economic complexes and the identification of the problems being solved in the systems of intersectorial coordination, which corresponds to them. Below we will speak about the ties, between the elements of the production economics system, at which enterprises, works and sectors function.

The Distinction of the Ties in the Production Economics System. In most instances the attempts to form intersectorial national economic complexes rest on the consideration of only one type of ties between the elements of the production economics system--the current deliveries of products [2]. At the same time a broader group of ties is examined in a number of works. The lists of ties, which are cited in these works, are presented in Table 1. For convenience of the analysis made later they are broken down into five groups.

Table 1

Ties Between the Elements of the Production Economics System

Group and ordinal number	Name of type of ties	Works containing lists of ties				
		[4]	[5]	[7]	[11]	[16]
I						
1.	Through the use of one natural resource	+				
2.	Through the use of identical resources					+
3.	Through the use of identical or interchangeable resources			+		
4.	Through the comprehensive use of natural resources		+	+		
II						
1.	Through the technological similarity of production		+			+
III						
1.	Through the interchangeability of products	+	+		+	+
2.	Through the complementariness of products				+	
3.	Through the meeting of identical ultimate demands					+
4.	Through the meeting of identical or interchangeable demands			+		
5.	Preference among products of final consumption			+		
IV						
1.	Through deliveries of products of current consumption in production	+				+
2.	Through deliveries of fixed production capital	+				+
3.	Of subsequent stages of the technological processes			+	+	
V						
1.	Territorial	+		+		
2.	Ties through transportation system	+				
3.	Through the infrastructure			+		
4.	Qualitative ties of the type: consumer - producer, science - production, information - management - production			+		
5.	Through the conditions of the creation of fixed capital		+			
6.	Through the role in the process of social production		+			

The first group consists of ties of four types. The first two types can be regarded as special cases of the third type. The ties of the fourth type are not specified in works [3] and [6]. However, it is possible to assume that it is a question of ties through the degree of the processing of natural resources, that is, those ties of works, in case of which the waste products of one of them, which are this resource at some stage of its transformation, serve as a raw material for another.

Only one type of ties--through the technological similarity of production--belongs to the second group. In work [3] the content of these ties is not revealed at all, while in work [6] the possibility of producing the products of one sector by means of the fixed capital used during the production of the products of another is understood as the technological similarity of production.

The ties through the interchangeability of products are mentioned most frequently among the ties of the third group. Here they are not specified in the indicated works, while in work [6] they are examined only with reference to the sectors which produce products of current consumption in production. In work [6, p 26] neither these ties nor the ties through the complementarity of the products are cited in the general list. The ties through the meeting of identical or interchangeable demands and the preferences between products of final consumption are introduced there. However, since the corresponding specifications are not given, both the meaning of the concept "interchangeable demands" and the content of the ties of the second type, which are not used at all in this work when studying the process of the formation of intersectorial national economic complexes, remain unclear. At the same time it is assumed that the ties through the interchangeability and complementarity of products play a significant role in the process of the formation of intersectorial national economic complexes, and they are examined with reference to products for both production and nonproduction purposes. Thus, in speaking about the need to distinguish the complex for the production of durable consumer items, the authors of the indicated work emphasize that the main type of ties between the sectors forming it is the ties through the complementarity of their products. Hence follows, in particular, the complementarity of such items as washing machines, refrigerators, televisions and passenger cars. Also, 'komplekt-nost' [completeness], a sign of complementarity, is absent in the consumption of these goods. What is more, it remains incomprehensible what (except for the relatively long useful life) connects the items, which are so different in the direction of their use. More likely it is possible to speak of the existence of grounds for the combination within intersectorial national economic complexes of the planning, for example, of the expansion of the system of laundries and the services rendered by them and the production of washing machines, the development of private and public transport and so forth. Thus, it is unclear not only what is meant by the tie through the complementarity of products, but also what in general is understood by the existence of a tie between sectors. The latter also pertains to the tie through the unity of the goal, which is introduced in work [6],² while in work [6] it pertains to the tie through the meeting of identical ultimate demands.

The fourth group includes three types of ties. The content of the first two does not arouse doubts. The ties of the third type in conformity with work [7] cover a few sectors, when the products of one of them are the main resource for another, they are thus a special case of the tie through deliveries of products of current consumption in production.

The greatest difficulties arise when analyzing the ties of the fifth group. The first three types of them can be considered, in all probability, only for enterprises and production associations. And it seems that they have no independent meaning for the management of the operation and development of these objects. Thus, the indicators of the plans of two enterprises, which are located in close proximity or have convenient underground mains, nevertheless are not dependent on each other, if deliveries and a similarity in the used resources, including manpower resources, and in the consumer properties of the output being produced are absent between them. At the same time precisely the latter factors should be taken into account when planning the location of enterprises and the development of the production and social infrastructure.

The ties of the fourth type can probably be regarded as a generalization of the ties through deliveries of products. However, why are they called qualitative? How do they differ on this level, for example, from ties through the community of resources?

The content of the ties of the fifth and sixth types are not revealed in work [3] and their interpretation is difficult.

On the basis of the analysis made above of the ties between the elements of the production economics system, which were distinguished in the examined works, it is possible to draw the following general conclusions.

1. The cited types of ties are characterized by considerable diversity, and it is explained, apparently, not so much by a different understanding of the problems of intersectorial coordination as by inadequate attention to the distinction of the intersectorial ties--the basis of the formation of intersectorial national economic complexes. The lists of types of ties in the examined works are formulated without any substantiation whatsoever.

2. The content of many types of ties is not revealed in the indicated works. The use of some of them for the formation of intersectorial national economic complexes arouses objection. At the same time questions not only on the specific types of ties, but also on the content of the concept "intersectorial tie" in general arise.

In this connection the need to make a special study of the interrelations of the elements of the production economics system is obvious. The construction of a classification of intersectorial ties, which is oriented toward finding meaningful attributes which characterize their diversity, should occupy an important place in this study.

A General Characterization of the Elements and Ties of the Production Economics System. Works, enterprises and sectors, as was already indicated, can be regarded as the elements of the production economics systems. Since the elements of the last two types are in a certain sense aggregates of the elements of the first type, let us make an analysis of the ties between works. The results obtained here are naturally carried over to the interrelations of enterprises and sectors.

By a works we will understand the element of the production economics system, which is characterized by:

the "output"--the product being created,³ as well as the waste which appears;

the "operator of transformation" ("operator")--the means of labor, specialists of various occupations and skills, the means of their unification and cooperation in the process of creating the given product;

the "input"--various resources, including semimanufactures, which are used as raw materials for the production of products or for ensuring the functioning of the elements of the operator (for example, the electric power consumed by machines and machinery, the special diet of workers).⁴

A large number of interacting works can be distinguished at any given moment in the economic system. Among them there can be ones of the same type, which are notable for their scale and for peculiarities, which are unimportant from the standpoint of the analysis being made, in the composition and structure of the elements and in the means of their combination. It is evident that when classifying intersectorial ties, such works can be considered identical. When distinguishing intersectorial national economic complexes as objects of planning, such a notion is also permissible. However, since the quantitative estimates of the closeness of the ties between sectors will also be an essential thing here, the works of the same type should be regarded as one works of the corresponding "sizes," that is, as a works which is a set of the individual works with the same characteristics of the input, output and operator of transformation.⁵ The All-Union Classifier of the Sectors of the National Economy was constructed in precisely this way. Although, for example, the mining of coal is carried out by the open-cut and shaft methods and the operators of the corresponding works are different, these differences from the standpoint of sectorial differentiation in the organization of planning and management are not significant. At the same time, when forming an intersectorial national economic complex as an object of management, that is, when the consideration of the interrelations between specific enterprises is necessary, such a generalization of the elements of the production economics system is illegitimate.

If we examine some period of time, the composition of the works belonging to the production economics system of the national economy can change, for example, due to the appearance of new types of them as a result of scientific and technical progress. Thus, the number of existing works during this period may be considerably greater than at any moment of it. At the same time the scale of the individual works can also change. These changes are connected with the inclusion of new elements in the operator or with the decrease of the existing ones. The "broadening" of the operator, which is predetermined by the development of production, can be accomplished by means of two sources: 1) the production of means of production and the training of specialists; 2) the redistribution of the functioning elements among works, which is permissible owing to the relative universality of many of them and the possibility of use in different technological processes. The "narrowing" of the operator can be accomplished as a result of the natural retirement of elements and their "transfer" to other works.

Let us now turn to the interrelations of works. They are caused by various factors which govern the need for their coordinated functioning and development. The mechanism of this coordination can be different. It can take place relatively spontaneously or can be accomplished by the system of management, which in turn can use different methods of coordination. The need for the coordinated development of a number of works can be caused by an entire group of factors, for example, deliveries of products, the use of the same natural resources and so on. We will assume

that each of these factors governs a separate tie at a large number of works. Thus, the identification of the indicated factors will lead to the determination of the interrelations of the works.⁶

The most diverse ties arise between the elements of the production economics system. We will classify them by two attributes. In conformity with the first one, which characterizes the nature of the factors governing them, let us distinguish the ties which were caused by production technological factors, the specific nature of natural processes and phenomena, the peculiarities of the nonproductive consumption of products. In conformity with the second one, which characterizes the limitations on the various parameters of works, let us divide the ties into four groups: through the input, through the operator of transformation, through the output and the product supplier-consumer ties.

Classification of the Ties of the Elements of the Production Economics System.
/The ties governed by production economics factors/ */in italics/* are determined by the existing technology, specialization and cooperation of production. Let us examine them in more detail, classifying them according to the attribute which characterizes the limitations on the parameters of works.

1.1. Ties Through Input. The limitations on the characteristics of the inputs of works correspond to them. Let us distinguish among them /ties through the use of identical, interchangeable resources/ */in italics/*, as well as /through the completeness /komplektnost'/ of the products being used/ */in italics/* (ties 1.1.1, 1.1.2 and 1.1.3 respectively).

The first ties cover the works which use the same critical resource. In this case the possibilities of developing each of them are determined not only by the total amount of the indicated resource, but also by the volumes of its consumption by other works. Thus, the development of these works needs to be coordinated. The problem of distributing the corresponding critical resource among the works using it should be solved in the process of coordination. Let us note that although different properties of resources can be used by works (petroleum, for example, can be used as both a fuel and a chemical raw material), the content of tie 1.1.1 here remains unchanged.

The ties of the second type also presume the solution of the problem of distribution, however no longer of one, but of some group of interchangeable resources. Hence arises the need to determine not only the volume indicators but also the pattern of consumption.

The ties through the completeness of the products being used are caused by the existence of such works, the output of which forms a quite stable set of products, which are produced in a specific proportion, and some components of which are consumed by various works. The latter in this case are considered to be covered by the tie of the type in question. The problem of coordination, which corresponds to this tie, will consist in maintaining certain ratios in the volumes of consumption. If such a problem is not solved, some components of the indicated set will "leave" the production economics system and will be lost for it.

1.2. Ties Through the Operator of Transformation. These ties cover works which have a similar composition and structure of a large number of elements of the operator of transformation. In conformity with the type of elements of the operator

let us distinguish the /ties through the community of the physical composition and structure of the fixed capital (I.2.1), the community of specialists (I.2.2) and of the natural resources used as elements of the operator (I.2.3)/ /in italics/

Ties I.2.3 in turn can be divided into ties through the use of the same (I.2.3.1) and different properties of the resources (I.2.3.2). In the latter case the resource is used by works at the same time. The use of lands by various sectors of plant growing can serve as an example of the tie of the first type, while the use of water resources by navigation and fishing can serve as an example of the tie of the second type.

The coordination of the development of works with respect to ties I.2.1, I.2.2 and I.2.3.1 consists in the distribution of the newly created elements of the operator and the redistribution of the already functioning elements of the operator, which are identical for them. In the latter case some works are regarded as an additional source for enlarging the scale of development of others. The problem of organizing the comprehensive, most efficient use of the resource arises in the process of planning and managing the works which are covered by ties I.2.3.2. Here the possible negative consequences, which are caused by the existing technology, of the use by some works of the same property of a resource for the use of its other properties should be taken into account. For example, the use of a water basin for timber floating limits the possibility of its use for breeding fish.

The identity of all or a portion of the elements of the operator of several works (which are covered by ties I.2.1, I.2.2 and I.2.3.1) creates the conditions for the solution of the problem of the efficient loading of their capacities. From the point of view of intersectorial coordination this circumstance is especially important in the process of placing in some sectors, when idle capacities are available in them, orders for the output of products which are characteristic of other sectors, which at the given moment, however, do not have the necessary capacities.

I.3. Ties Through Output. The limitations on the characteristics of the output of works, which create the need or expediency to coordinate these characteristics, correspond to the indicated ties. Among them it is possible to distinguish the /ties through interchangeability (I.3.1), complementarity (I.3.2) and the identity of the products being produced (I.3.3)/ /in italics/.

The examination of the ties of the first type requires the specification of the concept of interchangeable products. Let the products produced by works A and B be received at the inputs of works C and D respectively. Moreover, the products of the latter are identical. If at the same time the directions of the use of the products produced by works A and B coincide at works C and D, we will call the indicated products interchangeable. Thus, in the case of two versions of the generation of electric power (works C and D) petroleum (works A) and coal (works B) can be used as fuel: let the products of works C and D be represented as consisting of several sets of elements (a motor vehicle--the engine, the body, the chassis and so on) and let there be a subset of it (for example, the body), which at works C is manufactured from a product which is produced by works A (plastics), while at works D is produced from a product which is produced by works B (metal). Then the products which are produced by works A and B are interchangeable.

In general not two, but some group of products are interchangeable. Moreover, not individual products, but entire sets of them may be interchangeable. Depending on the nature of the products being produced, it is possible to speak about the interchangeability of the fixed capital and of the interchangeability of the products of current consumption. The interchangeability of products is relative in the sense that it is manifested not in general, but only in the case of their use at specific works. Finally, for some works the interchangeability of their products is not absolute, but is permissible only within certain limits.

When coordinating the development of works, which produce interchangeable products, it is necessary, on the basis of the indicators of the volume and structure of the demands for them, to determine the volume of output of each of these works. Among the factors, which should be taken into account when solving this problem, for many works the evaluation of the prospects of their development, which are connected with the possibility of using the resource base, is of great importance.

Among the ties through the complementariness of the products being produced let us distinguish ties of three types: /through the complementariness of the products of current consumption (I.3.2.1), of the fixed production capital (I.3.2.2) and of the products of current consumption and the fixed production capital (I.3.2.3)/ /in italics/.

The ties of each of these three types presume the existence among the group of works of a single consuming works which uses their products as a set. In the first case this is the completeness of the products of current consumption (sand and cement in the production of reinforced concrete), in the second case--the completeness of the elements of the operator of the consuming works (for example, sets of machines and equipment, which are used in sowing and harvesting work). Ties I.3.2.1 and I.3.2.2 presume the solution of the problem of ensuring the proportionality of deliveries. Here for the ties of the first type it is necessary to proceed from the ratios in the volumes of consumption of products, while for the second it is necessary to proceed from the ratios in the amounts of fixed production capital being used and the dynamics of its retirement. Ties I.3.2.3 combine the ties of the two described types. Frequently the individual types of products can be a part of a large number of sets and thus the corresponding works can be covered by some group of ties of type I.3.2.

Ties I.3.3 cover works which are engaged in the production of the same products. It is necessary to coordinate the volumes of the output of these works on the basis of the national economic demand for these products, the efficiency of the operation of each works and the possibility of its further development.

1.4. Product Supplier - Consumer Ties. Each of these ties is two-dimensional. Among them it is possible to distinguished the ties /"input - output" (I.4.1) and "output - operator of transformation" (I.4.2)/ /in italics/. In the terms introduced in section 2 of this work we will consider works to be covered by ties I.4.1, if the elements of the output of one of them belongs to the set of elements of the input of another. Among these ties let us distinguish in turn the ties /through deliveries of products of current consumption in production (I.4.1.1) and of production waste (I.4.1.2)/ /in italics/.

Among the set of works there are often distinguished chains of them, in which related works are the successive stages of the process of transforming a natural resource into some product (for example, the chain iron ore - pig iron - steel - rolled metal product), while the works themselves are called connected through the successive stages of the technological processes. The distinction of such chains plays an essential role when coordinating the distribution of these works, since owing to the specific nature of the indicated technological processes the transportation of products between such works over considerable distances is difficult. The distinction of such ties among the ties of type 1.4.1.1 requires, as is easy to see, the introduction of the new attribute "nature of output," which describes the degree of "transportability" of the products.

We will consider works to be connected by ties 1.4.2, if the elements of the output of one of them belongs to the set of elements of the operator of another. They can be divided into ties /through deliveries of fixed capital (1.4.2.1) and of natural resources used as elements of the operator (1.4.2.2)/ */in italics/*. It is possible to mention as an example of the latter the draining of swamps, their transformation into lands suitable for use in agriculture. The coordination of the development and functioning of works with respect to ties 1.4.1.1 and 1.4.2 consists in the coordination of deliveries in time, volume and product quality, as well as of the distribution of the corresponding works. Here the demands and possibilities of the output of products and the specific nature of their transportation should be taken into account. Coordination with respect to ties 1.4.1.2 presumes the solution of the problem of maximizing the use of waste products, based on their volume.

In the process of the operation of many works natural resources are consumed, and wastes, which enter the natural environment, are also formed. Therefore their development can depend on the /ties governed by the specific nature of natural processes and phenomena/ */in italics/*.

Among the ties through input let us distinguish the ties /through the completeness of the resources being used (II.1.1) and the mutual influence of natural resources (II.1.2)/ */in italics/*. The ties of the first type in many ways are analogous to the already described ties (I.1.3). But in contrast to the latter, in which the completeness of the products being produced is governed by the existence of the corresponding works, the completeness of the resources being extracted in this case is caused by the properties of these resources (which, however, does not eliminate the influence of the peculiarities of production on the proportions of the extraction of the resources which make up a set). Complex ores are an example of such resources. The completeness of resources does not mean, of course, that the works covered by ties II.1.1 necessarily consume all the components of the set. The problem of coordination with respect to these ties is basically analogous to the problem which corresponds to ties I.1.3.

The ties of the second type result from the fact that the consumption of certain natural resources by some works has an influence on the state of the natural resources used by others. Thus, logging causes the shallowing of rivers, that is, the decrease of water resources. The coordination of the development of works with respect to these ties presumes the determination of the permissible volume of consumption of each of the resources with allowance made for their mutual influence.

Among the ties through output let us distinguish the ties /through the effect on identical parameters of the environment (II.3.1)/ */in italics/*. They cover works

which have at least one of the following two properties: 1) wastes which have an effect on the same parameters of the natural environment (for example, which increase the content of specific substances in the air) are released in the process of their operation; 2) such wastes are formed as a result of the use of their products, which go for nonproductive consumption. Coordination with respect to these ties presumes the imposition of restrictions on the volume of wastes which are released as a result of the operation of each of the works, based on the standard values of the corresponding parameters of the environment.

The tie, which can be called a tie through the mutual influence of the parameters of the environment, is a generalization of tie II.3.1. Let us explain its content. Let wastes, which have an effect respectively on several parameters of the natural environment, which are in close interdependence, be formed in the process of the operation of a number of works. Then we will say that a tie through the mutual influence of the parameters of the environment exists between the works. Coordination with respect to these ties presumes the elaboration of restrictions on the volume of wastes which are released by each works, based on the standard values of the parameters of the environment and the indicators which characterize their mutual influence.

Among the "output - input" ties let us distinguish the ties */through the degree of the processing of natural resources (II.4.1)/*. These ties cover works which correspond to the successive stages of the processing of some nature resource, when the wastes of one of them, which are this resource at a specific stage of its transformation, can be a raw material for another works. For example, boughs and branches, which can serve as a raw material in the hydrolytic industry, are a waste product in the logging of commercial timber, in turn chips and sawdust, which are used as a raw material in the production of wood particle board and so forth, are a waste product in the process of producing lumber. Although these ties are two-dimensional, the examination of the chains of works, which are covered in pairs by these ties, is most important from the point of view of the problems of intersectorial coordination and the efficient use of natural resources. Coordination with respect to these ties consists in the coordination of the volumes of the processing of the resource along the chain of consuming works.

/The ties governed by the peculiarities of nonproductive consumption/ cover works, the products of which are used directly for meeting the demands of the population: individual people, collectives, society as a whole (for example, for maintaining the defensive capability of the country). The nature of these ties is determined by the specific nature of consumption. Therefore they are all ties through output. Among them let us distinguish the ties */through interchangeability (III.3.1) and complementariness (III.3.2)/*.

The ties of the first type cover works, the products of which have certain similar consumer properties or others. This similarity is determined in this case not by the peculiarities of the technology, but by the properties of the subject, in whose interests the process of production is being carried out. For example, fish and meat products contain a number of identical nutrients which are necessary to man, although the production technology of many of them is different. Coordination with respect to these ties consists in determining the volume and pattern of production on the basis of the standards which establish the optimum volume and pattern of consumption, as well as the preferences of replacement, the indicators of efficiency and the possibilities of the development of each works.

The ties through complementariness cover works, the products of which are consumed as a set. Coordination with respect to these ties consists in maintaining a specific proportionality of the output.

Many ties, which are governed by the peculiarities of nonproductive consumption, are relative in the sense that the coverage of individual works by them should be examined with respect to specific groups of the population, which are distinguished, for example, by living conditions, national features, level of income and so on.

The above-cited list of ties cannot, of course, be considered exhaustive. It can and should be enlarged and made more precise. Thus, the ties between works, which are governed by social factors, when their products influence identical parameters which characterize social processes, can be distinguished. For example, there are works which produce products, which in one case increase free time (excluding the time for keeping house) and in another decrease it, or works which produce products, which have an influence on demographic processes and the migration of the population and so on. Here the proposed classification attributes can play a significant role in the extension and specification of the ties between the elements of the production economics system and in the determination of the direction of further research.

The General Characterization of the Ties of the Elements of the Production Economics System. Classification Tables. The classification of the ties between the elements of the production economics system was examined above. It was made with respect to two attributes: the nature of the factors governing these ties and the type of parameters of works, on which restrictions are imposed. Classification tables were also constructed in conformity with these attributes.

The ties governed by production technological factors are presented in Tables 2-5: in Table 2--the ties through input, in Table 3--through the operator of transformation, in Table 4--through output and in Table 5--ties of the product "supplier-consumer" type. A characterization of the ties, which are governed by the specific nature of natural processes and phenomena and by the peculiarities of nonproductive consumption, is given in Tables 6 and 7. In all these tables there are indicated for each tie the problems of intersectorial coordination, which correspond to it, and the main factors and indicators which should be taken into account when solving them.

The first three types of ties, which are dictated by the restrictions on the parameters of production (the ties through input, output and the operator of transformation), are prerequisites of the horizontal integration of works, which is governed by the similarity of certain characteristics of them or . . . The differentiation and localization of the successive stages of the unified technological process of the transformation of natural resources into consumer items are the basis for the existence of the ties of the fourth group ("supplier-consumer"). These ties are in turn the basis of the vertical integration of works. Accordingly the first three types of ties can be called */horizontal/*, while the ties of the last type can be called */vertical/*.

In addition to the two indicated attributes the ties between works can be distinguished from the point of view of the results which can be obtained when solving the problems of coordination, which correspond to them. We will distinguish here

two types of ties, which we will conditionally call ties of /balance and efficiency/ /in italics/. The consideration of the ties of the first type makes it possible to obtain a balanced state of the production economics system. Among them, for example, are all ties of the "supplier-consumer" type. The coordination of the development of works with respect to the second type of ties makes it possible within the balance of the system to increase the indicators of the efficiency of its functioning. Thus, the consideration of the ties through the interchangeability of products of consumption in production makes it possible, on the basis of the possibilities of the development of the corresponding works and the total demand for products of this type, to determine the optimum (from the standpoint of the indicators of production efficiency and the consumption of each of the interchangeable products) pattern of production.

Table 2

Ties Governed by Production Technological Factors (I.1. Ties Through Input)

Characterization of ties	I.1.1. Ties through use of identical resources	I.1.2. Ties through use of interchangeable resources	I.1.3. Ties through completeness of products being used
Problems being solved when coordinating development of works with respect to distinguished ties	Distribution of resources among consuming works	Determination of volume and pattern of consumption of each works	Maintenance of corresponding ratios in volumes of consumption of products
Indicators which should be taken into account when solving problems of coordination	Total amount of resource, indicators of demands for resource	Indicators of demand for resources and efficiency of their use	Indicators characterizing ratios in the volumes of output of products

Let us now dwell on the difference of the intersectorial ties from the goals of socio-economic development. Here it is necessary to answer the question: Should the community of the goals being realized by sectors be grouped with one of the types of intersectorial ties, or is it an independent complex-forming attribute? The opinions on this account differ. In the majority of works the community or unity of the ultimate goals being realized (the identify of the final demands being met) is regarded as intersectorial ties, the authors of other works hold the latter point of view (see, for example, /10/).

In order to answer this question, it is necessary to clarify whether the community of the goal of operation in itself is a factor, which creates the need for the coordinated development of a group of sectors.

Table 3

Ties Governed by Production Technological Factors (I.2. Ties Through Operator of Transformation)

Characterization of ties	I.2.1. Ties through community of physical composition and structure of fixed capital			I.2.2. Ties through community of employed specialists		I.2.3. Ties through community of natural resources used as elements of operator	
	I.2.3.1. Same properties of resources			I.2.3.2. Different properties of resources		I.2.3.3. Same properties of resources	
Problems being solved when coordinating development of works with respect to distinguished ties	Distribution of newly produced and redistribution of operating fixed capital, solution of questions connected with implementation of uniform technical policy			Distribution of newly trained and redistribution of employed specialists		Distribution of renewed and redistribution of existing natural resources	
Indicators which should be taken into account when solving problems of coordination	Amounts of newly produced and operating fixed capital of given type, indicators of demands for this capital			Numerical compositions of newly trained and working specialists of given occupational skills group, indicators of demands for these specialists		Amounts of renewed and existing natural resources of given type, indicators of demands for these resources	
						Total amount of renewed source; indicators characterizing consequences of use of some properties of a resource for the possibility of using its other properties and the demands for the resource	

Table 4

Ties Covered by Production Technological Factors (1.3. Ties Through Output)

Characterization of ties	1.3.2. Ties through complementarity of products being produced			1.3.3. Ties through identity of products being produced
	1.3.1. Ties through inter-changeability of products being produced	1.3.2.1. Current consumption in production	1.3.2.2. Fixed production capital	
	1.3.2.1. Current consumption in production	1.3.2.2. Fixed production capital	1.3.2.3. Current consumption in fixed production capital	
Problems being solved when coordinating development of works with respect to distinguished ties	Determination of volumes of output of works	Maintenance of necessary ratios in volumes of deliveries of products to consumers	Maintenance of necessary ratios in volumes of deliveries of products to consumers	Determination of volumes of output of works
Indicators which should be taken into account when solving problems of coordination	Volume and pattern of demand, indicators of efficiency of works and possibilities of their development	Indicators characterizing ratios of consumption of products	Indicators characterizing ratios of volumes of used fixed production capital and dynamics of its retirement	Indicators characterizing ratios of volumes of consumption of products and used fixed production capital, as well as dynamics of its retirement
				Demand for products, indicators of efficiency of works and possibilities of their development

Table 3

Ties Governed by Production Technological Factors (1.4. "Supplier - Consumer" Ties)

		1.4.1. "Output-input" ties		1.4.2. "Output - operator of transformation" ties	
Characterization of ties		1.4.1.1. Ties through deliveries of series of production acts of current wastes consumption		1.4.2.1. Ties through deliveries of fixed production capital	
		1.4.1.2. Ties through deliveries of production wastes		1.4.2.2. Ties through deliveries of natural resources	
Problems being solved when coordinating development of works with respect to distinguished ties		Coordination of deliveries by volume, dates, assortment and product quality; optimization of distribution of works		Coordination of deliveries by volume, dates, assortment and quality; optimization of distribution of works	
Indicators which should be taken into account when solving problems of coordination		Indicators characterizing demands of consumer and possibilities of producer, specific nature of transportation of products		Indicators characterizing demands of consumer and possibilities of producer, specific nature of transportation of products	
		Volume of wastes received			

Table 6

Plans Governed by Specific Nature of Natural Processes and Phenomena

Characterization of ties	11.1. Ties through input			11.3. Ties through output		11.4. "Output-input" ties
	11.1.1. Ties through completeness of natural resources being used	11.1.2. Ties through mutual influence of natural resources	Determination of volumes of consumption of resources	11.3.1. Ties through effect on identical parameters of environment	11.4.1. Ties through degree of processing of natural resources	
Problems being solved when coordinating development of works with respect to distinguished ties	Maintenance of corresponding ratios in volumes of consumption of resources			Imposition of restrictions on amounts of wastes being released as a result of operation of each of the works	Coordination of volumes of processing along the chain of consuming works	
Indicators which should be taken into account when solving problems of coordination	Indicators characterizing ratios in volumes of extraction of resources	Indicators characterizing restrictions on volume of consumption of each resource; indicators of mutual influence of resources and demands of works		Standard values of parameters of the environment	Total amount of resource	

Table 7

Ties Governed by the Peculiarities of Nonproductive Consumption of Products

Characterization of ties	III.3.1. Ties through interchangeability of products being produced	III.3.2. Ties through complementarity of products being produced
Problems being solved when coordinating development of works with respect to distinguished ties	Determination of volume and pattern of output	Maintenance of necessary ratios in volumes of output
Indicators which should be taken into account when solving problems of coordination	Special-purpose standard, indicators of possibility of replacement of products, indicators of efficiency of works and possibilities of their development	Indicators characterizing ratios of volumes of consumption of products

Let us examine two examples. In the first the meat and dairy and the fish industries act as the sectors which are working toward the same goal (the meeting of the demand for food). Their products, obviously, are interchangeable within certain limits (from the point of view of an efficient pattern of nutrition), that is, the ties of the sectors through the interchangeability of products (III.3.1) corresponds to the community of the goal of the operation of the sectors in this example. Thus, the community of the goal in this case not only is not an independent complex-forming attribute, but also is not a new type of intersectorial ties.

In the second example let us examine the shoe industry and the baked goods industry as sectors which are involved in the achievement of the same goal, "The more and more complete meeting of the material demands of the members of society" ^[11]. Is it necessary to coordinate the indicators of the output of these sectors? It seems that it is not. The community of the demand being met thus does not give rise by itself to the interrelations of the works.

It is another thing that when distributing general resources it is necessary to compare the urgency of the demands for the corresponding products. It is necessary to make such a comparison not only for the named sectors, but also for all sectors which produce products of final consumption. The complexity of the indicated comparison presumes the structuring of the system which accomplishes it: the distinction of the subsystems in it and the relative decentralization of this process. Here the formation of special-purpose intersectorial national economic complexes--groups of sectors, the products of which are used for the realization in a specific manner of the structured ultimate goals of the plan--truly seems expedient.⁷ Thus, it is not the objectively existing ties between sectors, but the specific nature of the organization of the distribution of resources in the processes of national economic planning that is the basis for the distinction of systems of the intersectorial coordination of the development of special-purpose intersectorial national economic complexes.

FOOTNOTES

1. In some works they speak not about intersectorial ties, but about "factors" which should be taken into account when distinguishing intersectorial national economic complexes. Thus, in work [3], p 11/ it is proposed to carry out the "localization" of intersectorial national economic complexes with allowance made for the main goals of the development of the complex, the closeness of the production ties between sectors, their raw material unity, the identity or interchangeability of the demands which are being met by the products of the sectors, the existence of groups of allied, technological, as well as socio-economic peculiarities of works. It is not difficult to see that the majority of these factors correspond to the intersectorial ties presented in Table 1, that is, it is a question not of the specific nature of the approach, but of terminological differences.
2. In this work it is assumed that the tie through the unity of the goal covers, for example, the sectors which produce personal durable goods and the sectors of the agro-industrial complex. This tie, like the ties through the interchangeability and complementarity of products, is not mentioned in the general list presented in work [6], but is used in the procedure of forming intersectorial national economic complexes.
3. The concept "product" is used here in the broad sense, which includes, in particular, services. Moreover, the "output" can also consist of several products, if they are created in a single technological process.
4. We will call the products being created and the occurring wastes, the resources being consumed, the means of labor being used and the specialists using them respectively the elements of the output, the input and the operator of transformation.
5. In the process of the described aggregation of production in addition to the identity of the parameters of the input, the output and the operator of transformation, the parameters which characterize as a whole their position in the production economics system, for example, the parameters connected with the conditions of distribution, can also be taken into account. The latter circumstance is essential when distinguishing the elements of this system, which are regarded as the basis of the formation of the structure of management. The consideration of precisely these characteristics was, for example, the basis for the distinction during the postwar years of two ministries which carry out the management of a single sector, namely the USSR Ministry of the Fish Industry of the Eastern Regions and the USSR Ministry of the Fish Industry of the Western Regions [9].
6. A single tie can cover any number of works. The scale of the tie is determined subject to this number. It is the nth tie, if it covers n works.
7. See [12] for more detail on the peculiarities of the distinction of special-purpose intersectorial national economic complexes, their structure and the specific nature of the functioning of the systems of intersectorial coordination, which correspond to them.

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